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UTAH COAL INDUSTRY: A STUDY IN ECONOMIC GEOGRAPHY

DONALD GAIL PRINCE

UTAH COAL INDUSTRY:

A STUDY IN ECONOMIC GEOGRAPHY

by

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A thesis submitted to the faculty of
the University of Utah in partial ful-
fillment of the requirements for the
degree of

Master of Science

Department of Geography

June 1954

Chairman,

ACKNOWLEDGMENTS

This thesis is the result of a suggestion by Dr. H. Bowman Hawkes of the Department of Geography of the University of Utah. The writer is grateful to him for his aid in outlining the subject, and for his suggestions as to the methods to be used in the investigation. Appreciation is also given to Dr. Donald W. Meinig for his constant aid and encouragement during the preparation of this work, and to Dr. Elbert E. Miller of the Department of Geography and Dr. Francis W. Christiansen of the Department of Geology for their suggestions during the course of this research. Much of the credit for the completion of this work must go to my wife without whose aid in typing, patience, and encouragement during the course of my graduate work this study might never have been completed.

The material used in this work has been gathered from the published and unpublished reports on many aspects of the Utah coal industry, from material on file in the offices of some of the operating companies, and from interviews with many persons connected with the mining of coal. The photographs are all by the author and were taken during the course of the investigation. The writer's sincere appreciation is expressed to all those individuals who so generously gave of their time for the interviews noted in the bibliography and to the University of Utah Research Committee for the fellowship which made this work possible.

DONALD GAIL PRINCE

Salt Lake City, Utah
May 31, 1954

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CHAPTER ONE

INTRODUCTION

The importance of coal in the modern industrial economy cannot be overestimated. This age has been variously characterized as an "Age of Coal and Iron," "Steel Age," "Machine Age," and "Power Age." By whatever characterization we attempt to describe our modern industrial world, the significance of fuel and power are inherent in all of them. Today, bituminous coal ranks first in its contribution to fuel needs of the world, followed by petroleum, natural gas, and anthracite coal.[1]

Eighteen per cent of the area of the State of Utah is underlain by coal beds of varying thickness and quality (Plate I). The total reserves of all ranks of coal in the State are tremendous even when conservative calculations are made. As of January, 1950, the United States Geological Survey estimated that there were 92.5 billion tons of coal underground in Utah. Much of this is in thin seams and a considerable portion is wasted in the mining process, but even a 25 per cent recovery would insure an enormous future supply. Improved mining methods, with a greater percentage of recovery are constantly being developed and this will continually add to the recoverable reserves.

To the economy of Utah bituminous coal has always been of considerable importance. In the early days of settlement a great deal of effort was

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[1] Utah State Dept. of Publicity and Industrial Development, After Victory-Plans for Utah and the Wasatch Front, Salt Lake City: Utah State Department of Publicity and Industrial Development, June, 1943, p. 47.

expended in attempts to discover and develop coal in the territory. Later when the nonferrous metal industry began to expand coal was their main source of fuel and some of the smelting interests even acquired coal mines to insure a supply of fuel for their operations. When the production of iron began in Utah in 1925 and with the opening of the Geneva Steel Plant in 1943, coal took on added importance as the base of a new industrial era in the State and in the Intermountain West. It is important not only for the industrial expansion it may make possible in the future but also for the employment it creates both directly and indirectly. Coal mining in Utah has provided direct employment for between 3,000 and 4,000 workers for the past 40 years. Indirectly the industry has provided employment or business opportunities for several thousand additional workers throughout the State, particularly in the Carbon-Emery County area.

The problems facing the Utah coal industry are many and involved. The operators face physical problems in the production and transportation of the coal and economic problems of competition for markets. The physical conditions of the mining areas present many peculiar difficulties but the greatest physical problem is that of transportation. The mining areas are remote from any large consuming centers and as a result much time, effort, and money must be expended in moving the coal to market and these costs are increasing. The excessive productive capacity in the mining industry and the resulting severe competition among the different producers has long hurt the industry and has recently been intensified by the heavy competition from other fuels such as natural gas and fuel oil.

The human factors involved in the coal industry are much more difficult to determine and evaluate but they are equally as important as the physical and economic. The mine owner is faced with demands for increased wages and benefits by a militant union, with more stringent government regulation and supervision. On the other hand, the miner is confronted with a rising cost of living, less work, and much insecurity as to the future of his job. Thus the dilemma in which the industry finds itself becomes apparent. Despite these problems and the decline in coal markets and increasing competition, coal is the basic source of industrial energy and probably will never be replaced completely by any other source of power. The operator is now faced with rising costs in the face of dwindling returns, and while the long-range view offers the possibility of increasing use of coal in the future, the present situation demands that the industry make many adjustments to meet the changing conditions to avoid a period of depression until the future demand becomes a reality.

An understanding of the varied problems of this industry can only be gained through the work of persons in many fields. Geography may contribute through a presentation of the areal relationships of significant factors of the industry. The patterns of coal deposits, mines, towns, and transportation routes are shown and the political and economic factors which affect these patterns are considered. This study of the Utah coal industry was made in the hope that such a description and explanation of the spatial distribution of the facilities of the industry in its geographic setting might make some contribution toward the solution of the multitude of problems which today threaten much of this vital industry with possible ruin.

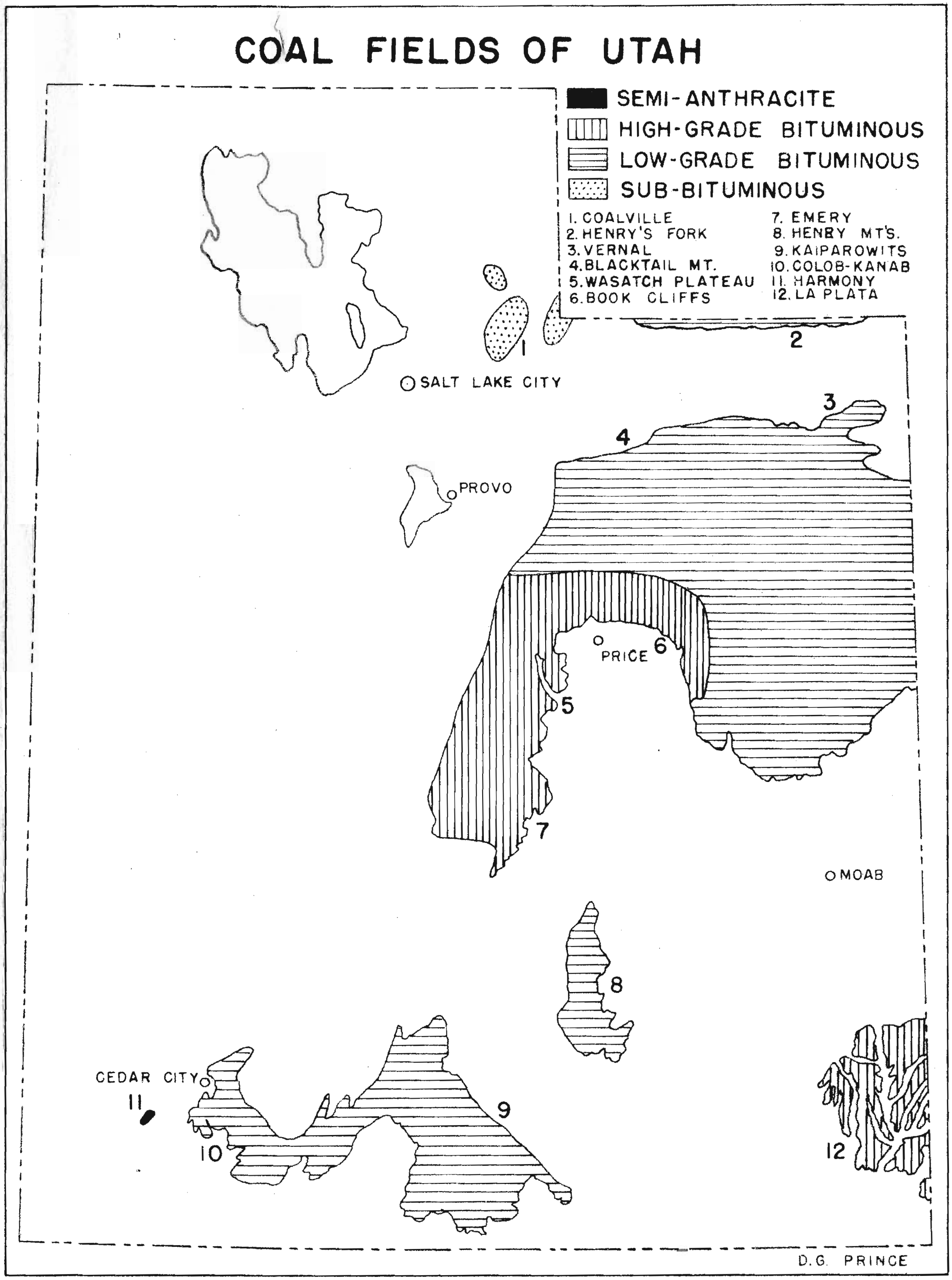
CHAPTER TWO

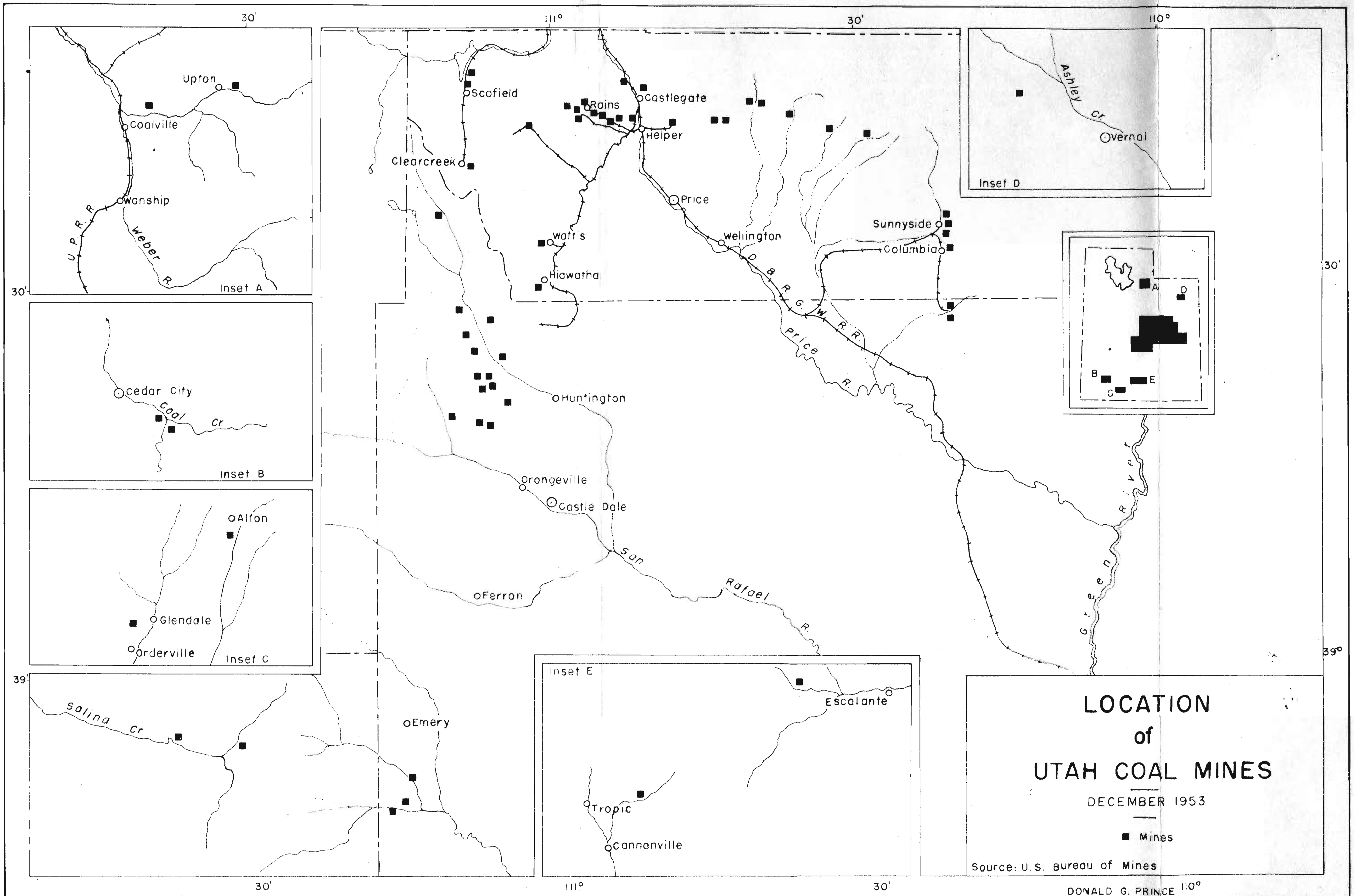
THE PHYSICAL SETTING

The United States Geological Survey recognizes twelve coal fields in Utah at the present time (PlateI). From north to south they are: (1) the Coalville field, (2) the Henry's Fork field, (3) the Vernal field, (4) the Blacktail Mountain field, (5) the Wasatch Plateau field, (6) the Book Cliffs field, (7) the Emery field, (8) the Henry Mountains field, (9) the Kaiparowits field, (10) the Colob-Kanab field, (11) the Harmony field, (12) the La Plata field. Despite the wide distribution of coal over the State the mining industry is centered in the area of high plateaus, steep cliffs, and rugged canyons which make up the Wasatch Plateau and Book Cliffs of Eastern Utah. Soon after these fields were opened they became the largest producing areas of the State and for the past seventy years they have produced over ninety per cent of the coal mined in the State (Plate II).

Geology

Subsurface geology has only a slight influence on the location of the individual mine as the outcrops of the coal beds are extensive and well exposed along the face of the cliffs, thus giving many suitable locations for opening mines. However the geologic structure of the coal fields in general and of the coal beds in particular has a marked effect on the pattern of development, the length of life of a mine, and the feasibility of exploiting any particular coal seam. The dip of the beds, degree of faulting, and the


COAL FIELDS OF UTAH
SEMI-ANTHRACITE
HIGH-GRADE BITUMINOUS
LOW-GRADE BITUMINOUS
SUB-BITUMINOUS
1. COALVILLE
2. HENRY'S FORK
3. VERNAL
4. BLACKTAIL MT.
5. WASATCH PLATEAU
6. BOOK CLIFFS
7. EMERY
8. HENRY MT'S.
9. KAIPAROWITS
10. COLOB-KANAB
11. HARMONY
12. LA PLATA
SALT LAKE CITY
PROVO
PRICE
MOAB
CEDAR CITY
1
2
3
4
5
6
7
8
9
10
11
12
D.G. PRINCE


LOCATION
of
UTAH COAL MINES
DECEMBER 1953
Mines
Source: U.S. Bureau of Mines
DONALD G. PRINCE
Inset A
Upton
Coalville
Wanship
Weber R.
U.P.R.R.
Inset B
Cedar City
Coal Cr.
Inset C
Alton
Glendale
Orderville
Inset D
Ashley Cr.
Vernal
Inset E
Escalante
Tropic
Cannonville
Salina Cr.
Emery
Scofield
Clearcreek
Rains
Castlegate
Helper
Price
Wattis
Hiawatha
Wellington
Sunnyside
Columbia
D. & R. G. W. R. R.
Price R.
Huntington
Orangeville
Castle Dale
San Rafael R.
Ferron
Green River
111°
110°
30'
39°

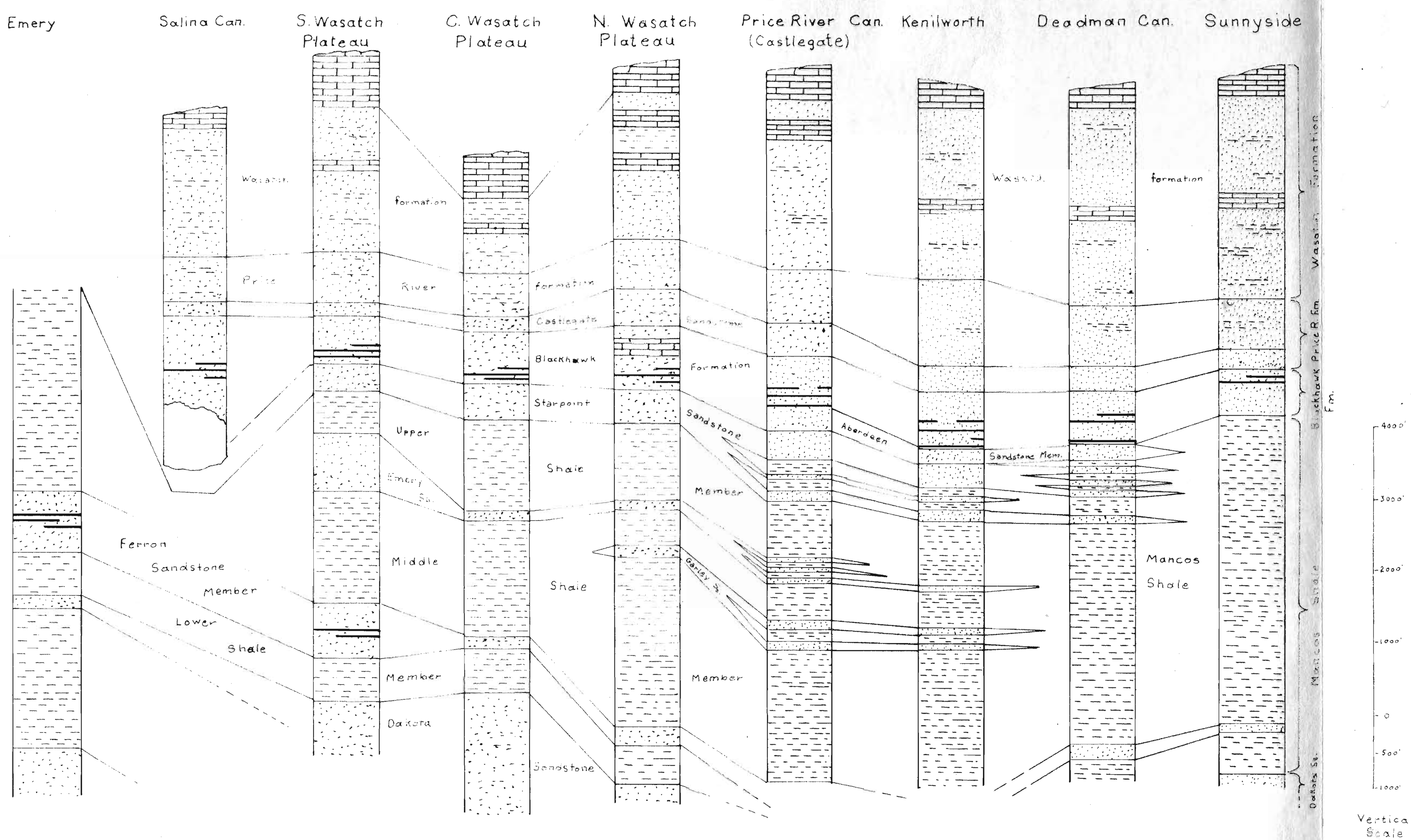
thickness of the seams are of particular importance to the underground mining conditions.

The rock formations exposed in the Utah coal fields range in age from Jurassic to Eocene with the valuable coal beds occurring in rocks of Cretaceous age: lower Cretaceous in the Northern and Southern Utah fields and upper Cretaceous in the Eastern Utah fields (Figure 1). The Cretaceous coal-bearing rocks consist of continental sandstones and shales laid down at or near the shores of Cretaceous seas. They are mostly cliff-forming sandstones with interbedded shales (Plate III).

The Book Cliffs and the Wasatch Plateau coal fields are essentially one geologic unit. The coal outcrops along the face of the escarpment and extends for over 200 miles from the Utah-Colorado boundary west and northwest to Price River Canyon and then south to Mt. Hilgard with no break. The boundary between the two fields at longitude 110° W. is entirely an arbitrary administrative division. In the broadest sense the geology of these two fields partakes of the characteristics of the major structural features of the region. The broad upwarp of the San Rafael Swell from which the rocks dip away in all directions, is the controlling structure of the region. The escarpment of the B ook Cliffs and the Wasatch Plateau is an erosional feature made up of rocks of Cretaceous age that continue the regional dip in all directions away from the San Rafael Swell. The Book Cliffs field is on the north flank of the Swell and the beds here dip gently to the

Age	Group and Formation	Member	Thickness in Feet	Character of Beds
Eocene	Wasatch Formation		1000-1200	Shale, variegated
		Flagstaff Ls.	800-1000	Limestone, blue, gray, and white, forms massive cliffs
			1000-1200	Shale, variegated -- red, purple, gray; Ls. white, gray; Sandstone, gray cong.
Uncon.				
Upper Cretaceous	Price River Form.		600-1000	Sandstone, gray; cong. coal-bearing east of Green River, Utah
		Castlegate Ss.	150-500	Sandstone, massive, white to gray
	Blackhawk Formation		700-1200	Sandstone, buff to gray; shale, extensive coal beds
	Starpoint Sandstone		300-1000	Sandstone, massive, buff to gray; intertongued by Mancos sh.
	Mancos Shale	Upper Sh. Member	300-1300	Shale, blue-black to gray, sandy
		Emery Ss. Member	50-800	Sandstone, massive to thin-bedded
		Middle Sh. Member	1650-2400	Shale, blue-gray, sandy
		Ferron Ss. Member	50-800	Sandstone, buff, brown to white, coal-bearing
		Lower Sh. Member	600-800	Shale, blue-gray
	Dakota Sandstone		2-130	Sandstone, brownish-gray, crossbedded, conglomerate
Jurassic ?	Morrison Formation			

Figure 1. Geologic formations of the Wasatch Plateau and Book Cliffs Coal Fields, Utah. (Source: U.S. Geological Survey Bulletins 819 and 793).



GENERALIZED SECTIONS OF ROCKS OF THE WASATCH PLATEAU AND BOOK CLIFFS COAL FIELDS, UTAH.

Source: U.S. Geological Survey Bulletins 819 & 793.

north and northeast at from 3° to 18°.[1] The Wasatch Plateau field is on the west and northwest flank of the San Rafael Swell; here the strata dip at angles of 1° to 20° to the west, northwest, and in places to the southwest.[2]

Displacement of the coal seams by faulting in the Wasatch Plateau field has presented some mining problems. This field, in addition to exhibiting the characteristics of the plateau country and the broad uplift of the San Rafael Swell to the east, is in the zone of transition between the plateaus and the Great Basin which is characterized by abrupt lithologic changes and increasing structural complexity westward into the Great Basin. Three normal, or gravity, fault zones cut the beds of this field in a north-south direction. The displacements range up to 2500 feet.[3] Displacements of the coal beds of this order of magnitude necessitates either the abandonment of the mine, the cutting of a rock adit to the other side of the fault block (Figure 2), or the development of the fault block as a separate mining unit (Figure 3). Faulting with minor displacements of 15 to 25 feet occurs in the Book Cliffs in the Sunnyside-Horse Canyon area and in other small areas along the cliffs.[4] These faults do not interfere with mining operations

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[1] Clark, F. R., "Economic Geology of the Castlegate, Sunnyside, and Wellington Quadrangles, Carbon County, Utah," United States Geological Survey Bulletin 793, 1928, p. 29.

[2] Spieker, E. M., "Wasatch Plateau Coal Field, Utah," United States Geological Survey Bulletin 819, 1931, p. 8-9.

[3] Ibid., p. 54-55.

[4] Clark, op. cit., p. 24-25.

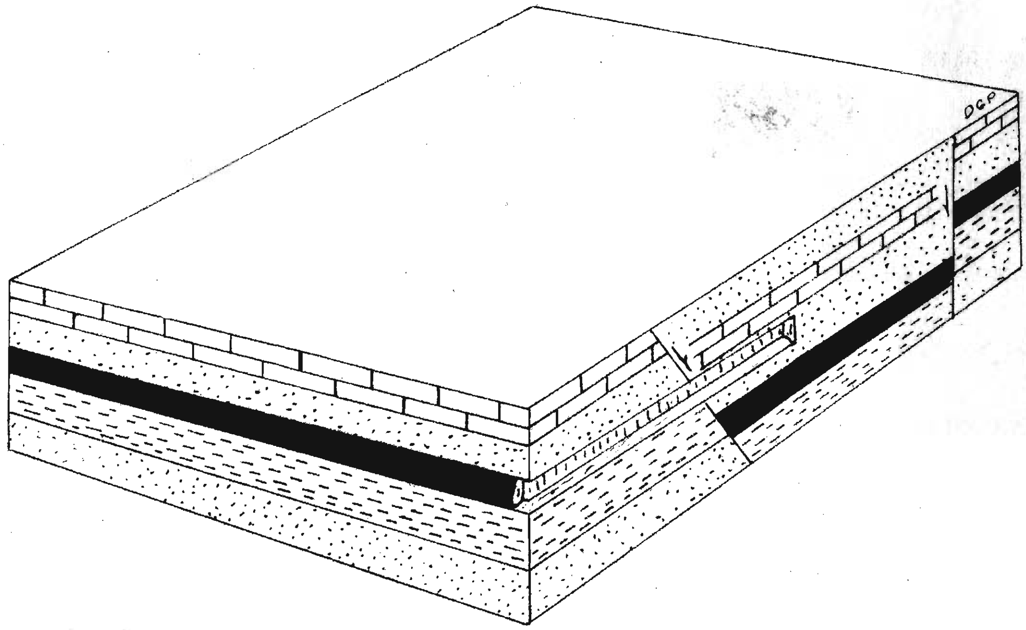


Figure 2, Adit (Rock tunnel) through a fault block to recover coal on the opposite side.

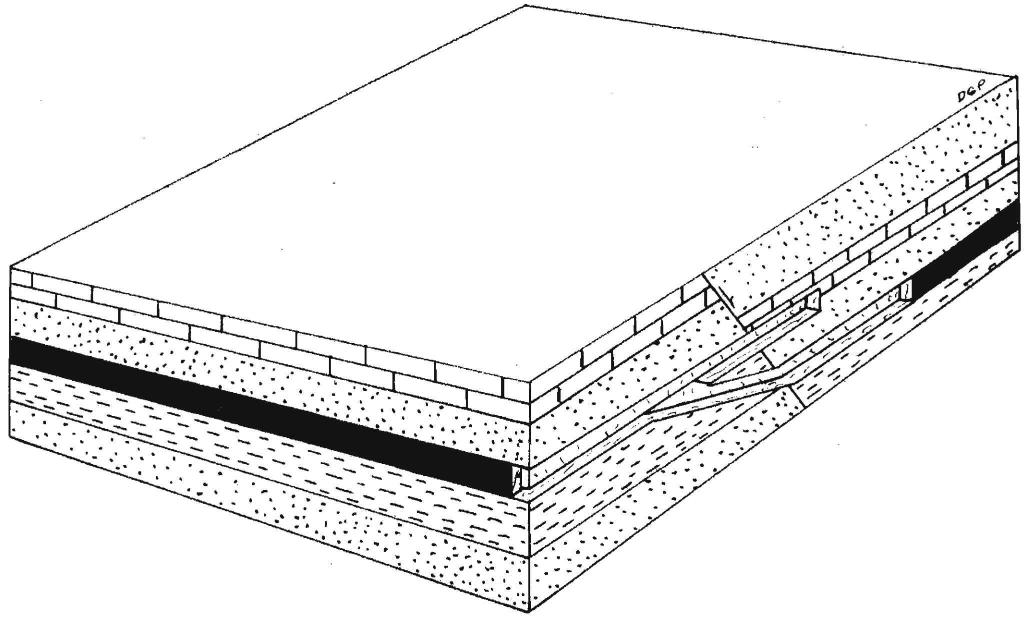


Figure 3, Inclined shaft (Rock slope tunnel) to recover coal in a fault block.

generally except where brecciation has weakened the rock to a point where additional back support is necessary.

The general thickness of the overburden covering the Utah coal beds has made strip-mining impossible and shaft mining uneconomic (Figure 4). The thick overburden limits the size of the rooms and increases the problems of roof stability and rock pressure. Roof stability involves control of the rock over the whole mine, but especially over the working areas. The problem is to prevent falls of roof rock which might be loosened during the mining operations. This type of accident is the leading cause of fatal accidents in coal mining today. Proper mining methods, involving efficient timbering and roof bolting, have helped to control this problem. A bad roof increases production costs because of the additional labor and materials required to control it properly. Rock pressure from the overlying cover is an important mining problem because in combination with the character of the roof and floor of the mine it determines the size of the pillars which must be left to support the roof.

In the Emery field, in southern Emery County, the coal beds occur in the Ferron sandstone member of the Mancos shale which crops out on the floor of Castle Valley. The resistant Ferron sandstone forms a series of cliffs known as the Coal Cliffs (Plate IV) on the east edge of Castle Valley. The coal beds crop out along the face of the cliffs south of an east-west line through Emery, Utah and the beds dip slightly to the west.

The northern Utah field near Coalville is located in the Central

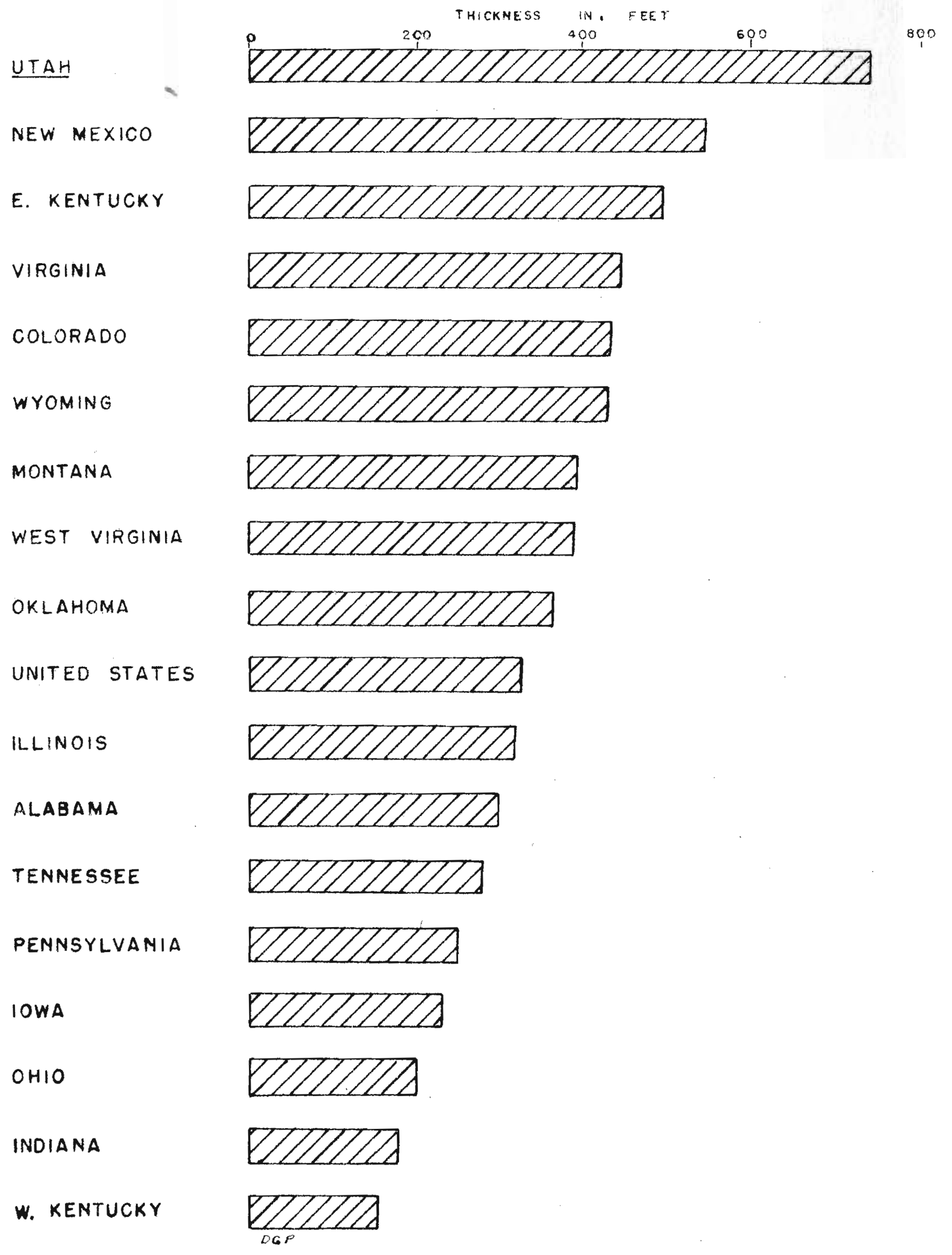
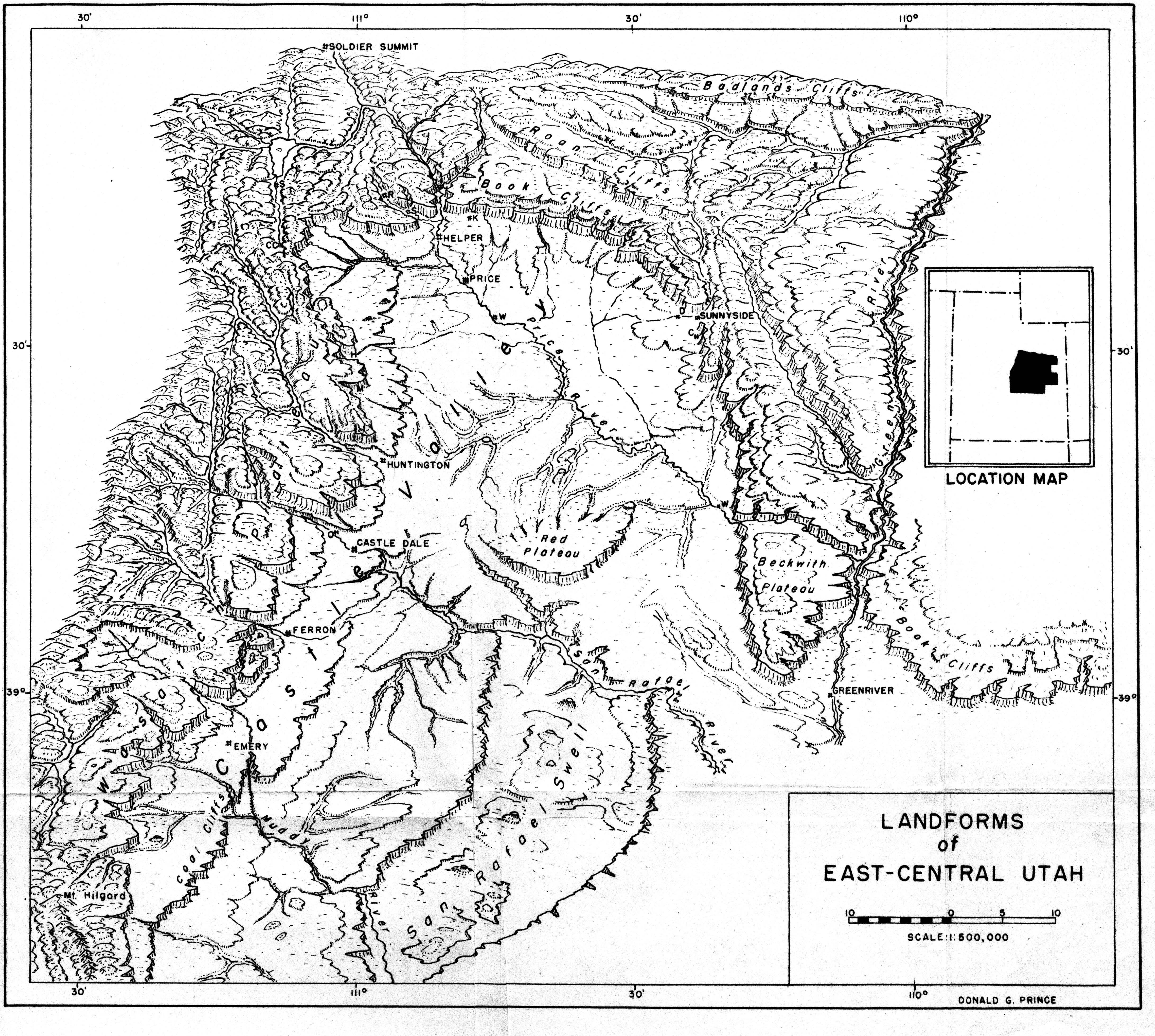


Figure 4, Average thickness of overburden over bituminous coal mines by states.


LANDFORMS
of
EAST-CENTRAL UTAH
LOCATION MAP
SCALE: 1:500,000
10 5 0 5 10
DONALD G. PRINCE
SOLDIER SUMMIT
Badlands Cliffs
Roan Cliffs
Book Cliffs
HELPER
PRICE
SUNNYSIDE
Price River
HUNTINGTON
CASTLE DALE
Red Plateau
Beckwith Plateau
Green River
Book Cliffs
FERRON
San Rafael River
GREENRIVER
EMERY
San Rafael Swell
Muddy River
Coal Cliffs
Mt. Hilgard
Castle Valley
Wasatch Plateau
30'
111°
110°
39°

Rocky Mountain Province and is consequently structurally more complex than the Eastern Utah fields which are in the Colorado Plateau Province. The Coalville field is in an area which has been much deformed in past geologic history. The Coalville anticline is the major structural feature of the area and the coal beds occur in rocks of Cretaceous age which dip away from the center of the anticline at angles of 15° to 25°. Faults have displaced some of the beds.[1] The coal areas of Northeastern Utah are influenced by the structure of the Uinta Mountains. The coal beds occur in Cretaceous rocks on the flanks of the Uinta Mountains. The Henry's Fork field has the northward regional dip of the strata on the north flank of the Uinta Mountains and is a southward extension of the coal fields of Southern Wyoming. On the south flank of the Uinta Mountains are the Vernal and Blacktail Mountain fields where the beds have the southward regional dip of the south slope of the Uintas.[2]

The Southern Utah fields, with the exception of the Harmony field, are found in the high plateau country and exhibit the geologic characteristics of this region. The beds are nearly flat lying with slight dips of 1° to 2° northeast found in some areas. Faults have displaced the beds in some localities but not to any great degree. The beds in these fields can

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[1] Wegeman, C. H., "The Coalville Coal Field, Utah," United States Geological Survey Bulletin 541, 1913, p. 161.

[2] "Analysis of Utah Coals," United States Bureau of Mines Technical Paper 345, 1925, p. 17.

seldom be traced for any great distance before they lense out and completely disappear.[1] The only anthracite coal found in Utah occurs in the Harmony field. The amount of coal in the field is small and it is not of good quality therefore it is of only local importance. This field is regarded as a part of a downfaulted block from the Colob Plateau to the east. The Harmony field has been extensively faulted and intruded by igneous rocks and it was the pressure and heat from this orogenic activity which metamorphosed the existing bituminous coal.[2]

The coal beds of Utah are characterized by their variability of thickness and their lenticular nature. The thickness of the Utah beds is variable from place to place but in general it is considerably above the national average.[3] The average seam being mined in the State today is eleven feet thick and little or no coal is mined from seams under five feet thick. A single bed may be of considerable thickness in one area but if it is traced along the cliffs it will gradually become thinner and may lense out completely or it may split and become two beds. The beds usually do not extend for over a few miles, although there are some exceptions such as the Hiawatha bed in the Wasatch Plateau field and the Castlegate "A",

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[1]Richardson, G. B., "The Harmony, Colob and Kanab Coal Field, Southern Utah," United States Geological Survey Bulletin 341, 1909, p. 383.

[2]"Analysis of Utah Coals," op. cit., p. 22.

[3]Hotchkiss, W. E., and others, Bituminous Coal Mining, (Philadelphia: WPA, National Research Project, 1939) p. 64.

Kenilworth, and Lower Sunnyside beds of the Book Cliffs field that are continuous throughout most of the fields.

Types of Coal

The rank, or degree of coalification, of coal is a function of geologic processes.[1] Coal is made up of carbon, hydrogen, oxygen, nitrogen, a little sulphur, and sometimes minute amounts of other elements. Coal classification is largely based upon a chemical analysis, called a proximate analysis, of the following items: (1) Volatile matter, the gases driven out when coal is heated to high temperatures, (2) fixed carbon, the coke-like residue that burns at higher temperatures after the volatile matter is driven off, (3) moisture, (4) mineral impurity, or ash, which is left when coal is completely burned.[2] For lower ranked coals, heating value and weathering properties determine the classification. The rank increases as the amounts of moisture and volatile matter decreases and the amount of fixed carbon increases (Table 1).[3]

The high-grade bituminous coals are further classified as coking or non-coking. A coking coal is one which softens and fuses together when

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[1] Coalification: The coal-making process by which the organic remains of abundant plant life is subjected to heat and pressure by the weight of the overlying rocks and eventually turned to coal. Sherman, Allan and Allen B. MacMurphy, Facts About Coal, U.S. Bureau of Mines, 1950, p. 1.

[2] Ibid., p. 6.

[3] Ibid., p. 1-2.

Table 1

CLASSIFICATION OF COAL BY RANK[1]

Class		Group		Limits of Fixed Carbon or B.T.U., Mineral Matter Free Basis
		1.	Meta-Anthracite	Dry F.C., 98% or more Dry V.M., 2% or less
I.	Anthracite	2.	Anthracite	Dry F.C., 92-98 per cent Dry V.M., 2-8 per cent
		3.	Semi-Anthracite	Dry F.C., 86-92 per cent Dry V.M., 8-14 per cent
		1.	Low-Volatile Bituminous	Dry F.C., 78-86 per cent Dry V.M., 14-22 per cent
		2.	Med.-Volatile Bituminous	Dry F.C., 69-78 per cent Dry V.M., 22-31 per cent
II.	Bituminous	3.	H.-Volatile Bituminous "A"	Dry F.C., Less than 69 per cent Dry V.M., More than 31 per cent
		4.	H.-Volatile Bituminous "B"	Moist B.T.U., 13,000-14,000
		5.	H.-Volatile Bituminous "C"	Moist B.T.U., 11,000-13,000
		1.	Sub-Bituminous "A"	Moist B.T.U., 11,000-13,000[a]
III.	Sub-Bituminous	2.	Sub-Bituminous "B"	Moist B.T.U., 9,500-11,000
		3.	Sub-Bituminous "C"	Moist B.T.U., 8,300-9,500
		1.	Lignite	Moist B.T.U., Less than 8,300[b]
IV.	Lignite	2.	Brown Coal	Moist B.T.U., Less than 8,300[c]

a This rank of subbituminous weathers more rapidly than the high-volatile bituminous "B" coal

b Consolidated

c Unconsolidated

[1] Sherman, Allan, and Allen B. MacMurphy, Facts About Coal, United States Bureau of Mines, 1950, p. 2.

heated to a high temperature in the absence of oxygen. As it is further heated some degradation of the coal substance occurs and the volatile liquids and gases are driven off and a dull, porous mass called coke remains. Because of the importance of carbon in the making of steel a low-volatile coal is desired for coking if it possesses the other necessary properties. A non-coking coal may appear identical to coking coal and its composition may be similar, but when processed in a coke oven it leaves a char or powdery residue instead of coke.[1]

Utah coals rank from sub-bituminous to anthracite (Table 2). The coal produced in the Carbon, Emery and Grand County fields is a high-grade bituminous coal, that from the Coalville, Vernal, Blacktail Mountain, and the Southern Utah fields, except the Harmony field, are low-grade bituminous. The Harmony field has the only anthracite coal in Utah, but a high ash and sulphur content prevents it from being classified as high-grade.

The only commercial coking coal found in Utah at the present time is in the Book Cliffs field near Sunnyside and the mines producing this type of coal are owned by the steel companies. However, this coal does not have the optimum coking qualities desired in steel making and therefore at the coke ovens it is blended with eleven per cent Oklahoma coal and four and one-half per cent pitch to bring it to the desired standard.[2]

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[1] Ibid., p. 2.

[2] Waggoner, C. L., "Observations on Raw Materials Used in the Geneva Steel Plant," Rocky Mountain Coal Mining Institute Proceedings, 43:79, 1947.

Table 2

ANALYSIS OF COAL FROM SELECTED FIELDS AND AREAS[1]

Location of Sample or Mine	Moisture	Proximate (Percent) Volatile Matter	Fixed Carbon	Ash	Calorific Value Calories	B.T.U.
Wasatch Plateau						
Hiawatha	5.9	41.9	45.5	6.7	6,985	12,570
Wattis	6.9	41.4	47.2	4.5	6,994	12,590
Huntington Canyon	7.6	42.6	44.7	5.1	7,167	12,900
Clear Creek	6.5	45.6	44.4	3.4	7,100	12,780
Salina Canyon	6.4	45.1	36.3	12.2	6,528	11,750
Emery Field						
Browning Mine	3.9	40.9	49.3	5.9	7,206	12,970
Book Cliffs						
Castlegate	4.2	41.1	49.0	5.7	7,117	12,810
Spring Canyon	3.3	42.2	46.2	8.5	7,039	12,670
Kenilworth	3.2	43.4	48.3	5.1	7,112	12,820
Sunnyside No. 1	4.0	38.0	51.3	6.7	7,289	13,120
Horse Canyon	4.8	38.2	52.0	5.0	7,328	13,190
Sego	8.0	36.1	46.8	9.1	6,550	11,790
Coalville Field						
Chappell Mine	14.6	37.1	43.8	4.5	5,901	10,620
Vernal Field						
Vernal, 6 Mi. N.	8.5	34.3	47.1	10.1	6,250	11,250
Colob-Kanab						
Coal Cr. Can.	4.9	38.0	43.2	19.9	6,039	10,870
Orderville 1 Mi. South of	16.6	32.6	37.4	13.4	4,378	7,880
Harmony Field						
New Harmony, 4 Mi. Northwest of	7.0	10.3	60.6	22.1	5,783	10,410
Kaiparowits Field						
Escalante	24.8	33.0	32.9	9.3	4,122	7,420

[1]"Analysis of Utah Coals," United States Bureau of Mines Technical Paper 345, 1925.

Physiography

The surface configuration of the coal mining regions is probably the most important single factor in the location of the mines, settlements, and transportation routes. It has posed many problems and has given many advantages to the coal mining industry. The outcrop of the coal seams along the face of the escarpment has given easy access to the coal, and the cutting of the deep canyons through the escarpment has provided ideal sites for mine entries and tipples. On the other hand these same canyons forced the building of roads and railroads in the stream valleys whereas the shortest route would be along the face of the escarpment.

The physiography of the Carbon-Emery county coal fields is dominated by the bold erosional escarpment of the Book Cliffs[1] and the front of the Wasatch Plateau (Plate IV). This escarpment extends in a horseshoe shape from Greenriver, Utah north to Sunnyside, west to Spring Canyon and then south to Mt. Hilgard in Sevier County. The cliffs are formed by the resistant edges of a series of almost flat lying cretaceous beds of sandstone which are underlain by shale that form steep slopes. The coal beds are found in these cliff-forming sandstones. Along the Book Cliffs portion of the escarpment and in the north end of the Wasatch Plateau the cliffs are broken by steep boulder-strewn slopes but further south along the Wasatch Plateau the cliffs rise sharply 2500 to 3300 feet above the valley floor. (Figures 5 and 6)

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[1]From a distance the strata give the impression of the leaves of a book lying on its side; hence the name.

Figure 5. Escarpment of the Book Cliffs at Castlegate. Note steep boulder strewn slopes below the cliffs. Tipple, washery and machine shops of the Castlegate Mine of the Independent Coke and Coal Company.

Figure 6. Escarpment of the Book Cliffs north of Helper, Utah. Hill at left is remnant of gravels spread over valley in the past and is now dissected by the Price River flowing along the line of trees at right.

The front of the escarpment partakes of the nature of the semi-arid region to the south and east. The plateau surface is protected from erosion by the sandstone layers which overlie the gray shale of Castle Valley. The rugged and sharply dissected cliffs have resulted from the recession of the edges of the nearly horizontal strata by stream erosion processes typical of the arid and semi-arid regions of the west. During the summer heavy rainstorms of the cloudburst type break over the plateau and a large amount of precipitation is poured on a small area of nearly barren rock and soil in a short time. Within a few minutes after such a storm much of this water is concentrated in the usually dry gullies and washes leading into the valleys below. The raging waters carry immense loads of debris, gouging out their channels at visible rates. These torrents cut rapidly into the soft shale that underlies the sandstone cliffs causing the sandstone to break off along joint planes in great blocks, leaving bare, vertical cliffs and boulder-strewn slopes[1] (Figures 7 and 8).

The higher levels of the plateaus, back from the escarpment, present a striking contrast to the semi-arid conditions, cliffs, and rugged canyons of the country near the escarpment. These lands, lying 8,000 to 11,000 feet above sea level, receive a more abundant supply of precipitation, mostly in the form of winter snows, and support a rich variety of spruces, pines, aspens and rich grasses typical of the mountainous lands of the west. The water of these high plateaus is especially valuable as a

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[1]Spieker, op. cit., p. 8-9.

Figure 7. Escarpment of the Book Cliffs north of Horse Canyon.

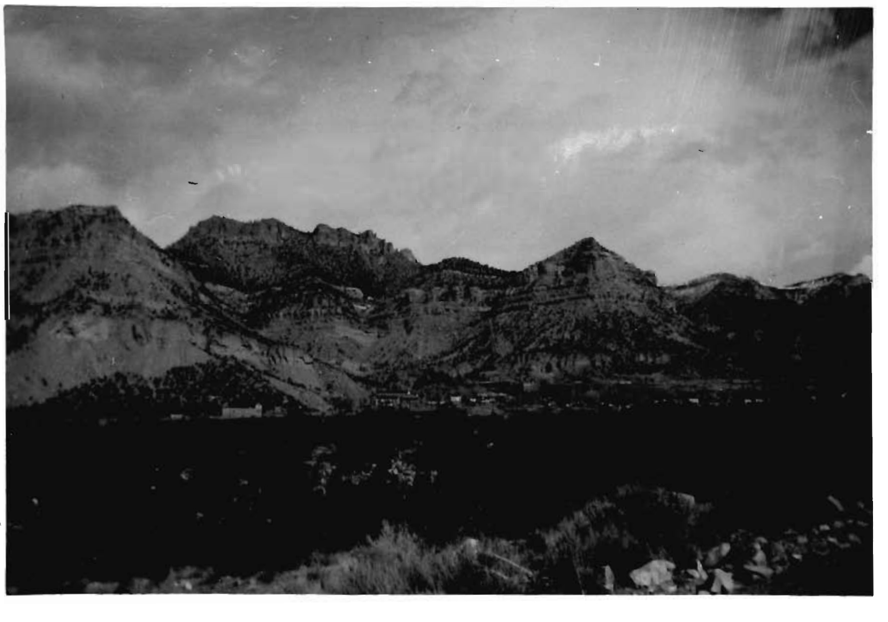

Figure 8. Escarpment of Book Cliffs behind Kenilworth.

source of supply for the mining industry and for all of the culinary and irrigation water for Carbon and Emery Counties.

Castle Valley extends away from the escarpment for six to fifteen miles before it breaks into the San Rafael Swell in a series of cliffs. The floor of the valley is rolling country dotted with low gravel-capped hills. Near the base of the cliffs and extending for several miles out into the valley are a series of pediments that were developed from an old erosional surface, probably of Pleistocene in age. The pediment and the underlying bedrock have been dissected by the streams of the region to depths up to 200 feet, producing a youthful topography near the cliffs and out into the valley. The Price River, the only large stream in the region, has cut a relatively wide flood plain into the northern end of the valley and Huntington, Cottonwood, Ferron, and Muddy Creeks have also reached this mature stage where they cross Castle Valley.

The deep, rugged, V-shaped canyons that cut the escarpment offer the ideal sites for the location of mine entrances and tipples. The position of the outcrop of the coal beds on the face of the cliffs has exposed the coal to many centuries of weathering and burning. The cause of this burning is unknown; it may have been caused by lightning, spontaneous combustion, or by human acts. Regardless of the cause, on the exposed face of the cliffs or at the points of ridges the burning has been found to extend several hundred feet back from the outcrop.[1] This condition allows the rocks to

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[1] Clark, op. cit., p. 29.

cave and makes entrance at these points difficult or impossible. In the canyons however the erosion process has removed much of the weathered coal so that here marketable coal is much closer to the surface. The position of the good coal nearer the surface combined with the dip of the coal beds into the mountain makes the canyons ideal sites for the opening of a mine. The building of the mine opening at this point makes it possible to have a favorable grade on the haulage routes in the sections of the mine on the up-slope side of the main entry. The tipple is usually located slightly up on the side of the canyon wall where gravity can be utilized to the fullest in the preparing and loading of the coal (Figure 9).

The canyons and stream valleys of the region are the sites of the transportation routes used in the movement of the coal to market. The valley of the Price River as it crosses northern Castle Valley and its steep canyon through the plateaus is the funnel for the main arteries of transportation from the coal fields to Northern Utah (Figure 10). The mainline of the Denver and Rio Grande Western Railroad and U.S. Highway 50-6 follow this canyon north to Soldier Summit and on to Central Utah. At intervals roads and branch lines of the railroad leave the main line and follow stream valleys up to the mines along the escarpment. The most direct routes to the mines lie along the base of the cliffs but the rugged surface features extending out from the cliffs make rail and road construction impractical as it would involve a prohibitive amount of bridging or filling to cross the many gullies and washes. The Utah Railway from Martin to Mohrland is

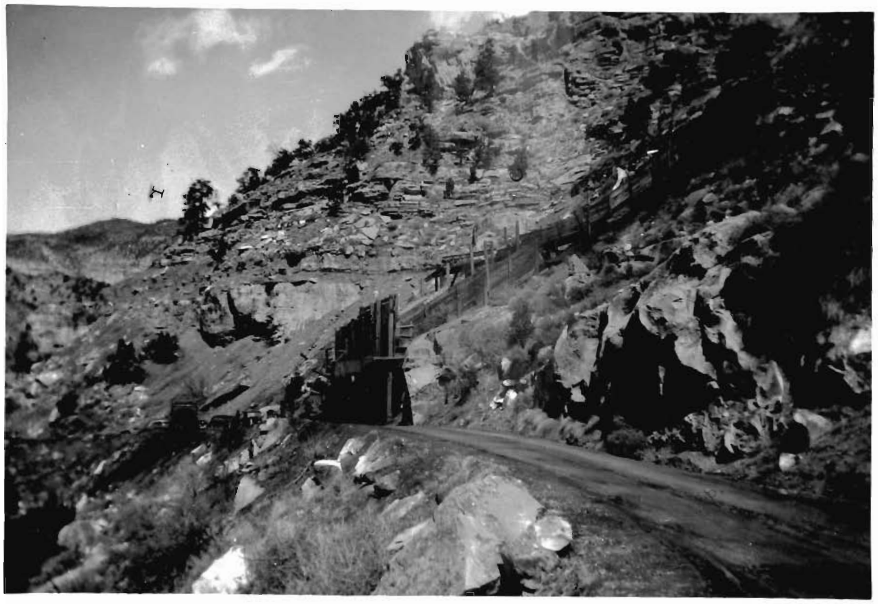

Figure 9. Simple loading and screening chutes at a small truck mine northwest of Helper. Note the use of gravity in the process. The mine of the Hardscrabble Coal Co.

Figure 10. Canyon of the Price River as it cuts through the Book Cliffs. Mainline of the Denver and Rio Grande Western Railroad on right and U.S. Highway S50-6 on the left.

is the only exception to this rule (Plate VIII). There are no railroads in the Emery County mining areas but the roads follow the canyons to the mines and some continue on over the top of the plateau to the towns in Sanpete County and Southern Utah where much of the coal is marketed.

The physical framework of the Utah coal industry has given the industry both advantages and problems. The geology is generally favorable for mining, the quality of the coal is generally adequate to serve western markets, and although the physiography presents some problems the industry has adapted itself to the conditions in the building of its mines, processing facilities, towns, and other installations.

CHAPTER THREE

DEVELOPMENT OF THE UTAH COAL INDUSTRY

Pioneer Period

The time and date of the first discovery of coal in Utah will never be known but it is probable that its existence was known to the Indian inhabitants of the State. The early Spanish traders who plied the old Spanish Trail across southeastern Utah in the Indian slave trade may have known of its existence in the areas they crossed but no record of it has been found.

The first permanent settlers to enter the Utah territory were the Mormon Pioneers who had migrated to this country, then a part of Mexico, to escape the religious persecution which had been heaped upon them in every other place they had attempted to settle. The first objective of the church leaders was to make the colony a self-sustaining economic unit. This program was undertaken because of the isolation of the colony and because of the desire of the church to avoid, as far as possible, the contacts with non-member people which had led to their previous troubles. Agriculture was encouraged and land was given to the head of each family according to his needs. Mining, except for the basic minerals, coal, iron and lead, was openly discouraged by the church leaders.

Fuel for the growing settlements was supplied from the forests of the surrounding mountains; however, the cost of hauling wood from the mountains and the diminishing supply of timber made the need for a better source of fuel evident very early in the history of the State. Despite the need for coal in the centers of settlement in northern Utah the first mining of coal took place in southern Utah in connection with attempts to establish an iron industry near Cedar City. An exploring party reported deposits of high-grade iron ore near the present site of Cedar City in 1850.[1] The Mormon leaders were quick to realize the value an iron industry would have to their isolated colony and soon took steps to develop this resource. Exploring parties scouted the surrounding country and found coal in the canyons of the plateaus a few miles east of the iron deposits. The first iron was produced in December 1852. Operations continued for several years despite difficulties posed by severe winter weather, floods, and Indians. In 1854 many of the colonists left for more attractive regions and the church-sponsored iron producing venture ended.[2] Several attempts were made to revive the industry in later years but none succeeded. Coal mining has continued in the area on a small scale to supply local needs.

In an effort to spur exploration for a fuel source close to Salt Lake City the territorial legislature offered a reward of $1,000 to any person who could find a coal bed at least 18 inches thick within 40 miles of Salt Lake City. Coal was discovered near the present site of Coalville, Summit County

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[1] Lewis, Anna Viola, "Development of Mining in Utah," Unpublished Masters Thesis, Department of History, University of Utah, 1941, p. 12.

[2] Ibid., p. 115.

in 1859, possibly as a result of this offer. Further discoveries were made in the Coalville area in 1863 and 1864 but becuase of the high cost of hauling the coal by wagon the price in Salt Lake City remained at about \$40 per ton. The building of the Union Pacific Railroad down Echo Canyon and Weber Canyon, a few miles from the mines, in 1869 spurred activity and for a few years this area was a leading producer.[1]

At about the same time as the initial discovery near Coalville two immigrant miners from Wales learned of coal in the Sanpete Valley from the Indians. In 1857 the town of Wales was founded and the first mine opened in the valley. The coal was of coking quality and the next year ovens were built and the coke hauled to Salt Lake City by wagon. In the next few years the ownership of the mine changed hands several times; included was an English company which built a branch railroad into the area from Nephi, but the area was later abandoned because of lack of funds and because it was unable to compete with the newly developed eastern Utah fields that had more favorable mining conditions.

The first documented evidence of coal in the Wasatch Plateau field is found in the report of the transcontinental railroad survey that crossed central Utah in 1853. This report, written by Lieut. Edward G. Beckwith, states, under the date of October 11, 1853: "Specimens of coal were brought in from the hills near camp, Capt. Gunnison and Dr. Schiel differ-

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[1] Roe, James M., "Some Important Impacts of Geneva Steel on the Utah Economy," Unpublished Masters Thesis, Dept. of Marketing, University of Utah, 1953, p. 11.

ing in opinion as to its quality."[1] The party was camped at this time near the north end of the Emery coal field.[2]

The quest for a source of good coal in Utah soon led to the Wasatch Plateau where a mine was opened near the headwaters of Huntington Creek in 1875. A few coke ovens and a settlement called Connelsville were built, but the old plague of high transportation costs forced the closing of this mine after three years of operation.[3] Pleasant Valley, the first large coal producing area of Utah, was opened shortly after Connelsville. The actual date is disputed but it must have been in late 1875 for construction on a railroad into the area was begun in 1876. Several mines were soon opened and the first coal mined was hauled by wagon to Springville.

The failure of many of the early coal mining ventures in Utah may be directly attributed to a lack of adequate transportation. The full development of the Pleasant Valley field was not accomplished until the Utah and Pleasant Valley Railroad, a narrow-gage line from Springville to Winter Quarter, was completed in 1879.[4] Its completion broke the virtual monopoly

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[1] U.S. War Department, Explorations and Surveys for a Railroad Route to the Pacific Ocean, Vol. 2, (Washington, D.C.: 1854), p. 62.

[2] Lupton, C.T., "Geology and Coal Resources of Castle Valley in Carbon, Emery and Sevier Counties, Utah," U.S. Geological Survey Bulletin 628, 1926, p. 9.

[3] Spieker, Edmund M., op. cit., p. 1.

[4] Johnson, David F., History and Economics of Utah Railroads," Unpublished Masters Thesis, Dept. of Economics, University of Utah, 1947, p. 52. Winter Quarters was the first mining town in the Pleasant Valley field. It was located west of the present town of Scofield. Mining continued there until the disaster of 1900 when 218 men were killed in an explosion in the Winter Quarters mine. Since that time the mine has been closed and the town abandoned.

of the Utah coal trade held for many years by the Union Pacific Railroad, who controlled the Coalville and southern Wyoming coal fields, and insured the future of the eastern Utah coal industry. Expansion of production was rapid in the area and by 1889 the Pleasant Valley field was producing 90 per cent of Utah's coal.

Utah Fuel Company Period

The original operating company in the Pleasant Valley field was the Pleasant Valley Coal Company. In 1882 this company sold its properties to the newly formed Utah Fuel Company. The Pleasant Valley Coal Company then conducted some explorations along the front of the Book Cliffs and the Wasatch Plateau in Carbon County. Favorable reports of these explorations led to the opening of the Castlegate No. 1 mine in 1890.[1] Shortly thereafter this property was purchased by the Utah Fuel Company and the Pleasant Valley Coal Company ceased its operations. The Utah Fuel Company continued the expansion begun by its predecessor, opening the Sunnyside No. 1 mine in 1898, and remained one of the largest operators in the Utah coal industry until its properties were sold in 1950.[2]

Increased output of the Utah metal mines in the last years of the nineteenth century brought about an increased demand for coking coal; as a result some coke ovens were built at Castlegate soon after the mine was

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[1] Sutton, Wain, Utah-A Centennial History, (New York: Lewis Historical Publishing Co., 1949), p. 875.

[2] Loc. cit.

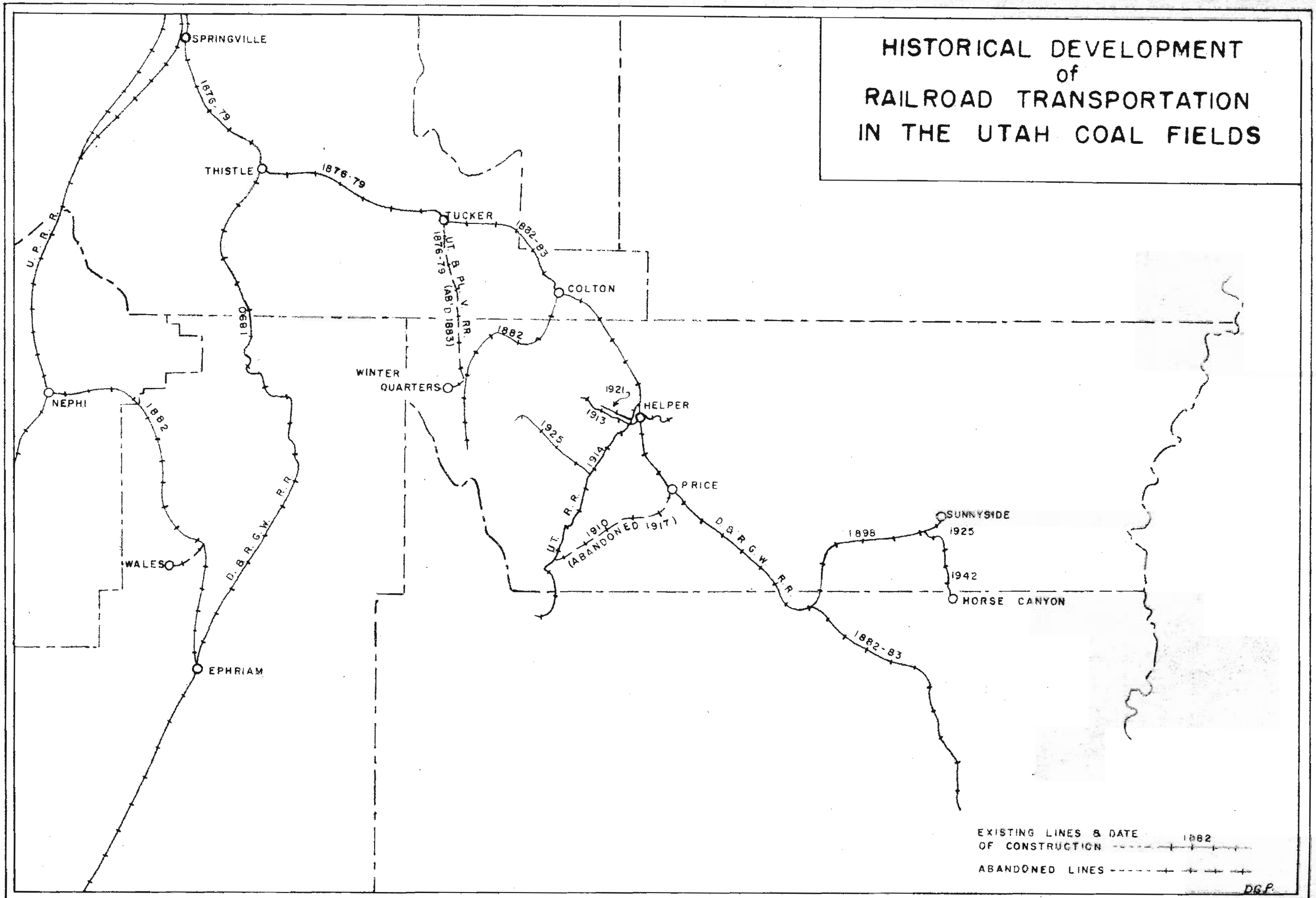
HISTORICAL DEVELOPMENT
of
RAILROAD TRANSPORTATION
IN THE UTAH COAL FIELDS
SPRINGVILLE
1876-79
THISTLE
1876-79
TUCKER
1882-83
U.P.R.R.
UT. & PL. V. RR.
1876-79 (AB'D 1883)
COLTON
1890
1882
WINTER
QUARTERS
NEPHI
1882
1921
HELPER
1913
1925
1914
PRICE
UT. R.R.
1910
(ABANDONED 1917)
D.&R.G.W. R.R.
SUNNYSIDE
1898
1925
1942
HORSE CANYON
WALES
D.B.R.G.W. R.R.
EPHRIAM
1882-83
EXISTING LINES & DATE
OF CONSTRUCTION
1882
ABANDONED LINES
DGP.

PLATE V

Grande Western Colorado lines was made in April 1883 at the State boundary.[1]

The original narrow gauge line was standard gaged in 1898. The increased production of the coal mines in the early ears of the twentieth century made the double-tracking and reduction of some steep grades a necessity if the line was to give proper service. It is thought that these improvements may have been hastened by the beginning of construction of a competing line, the Utah Railway, at Springville and Hiawatha.[2]

Expansion Period

The first 25 years of the twentieth century was a period of great expansion of the production and capacity of the Utah coal industry (Figure 11). The dominance of the industry by the Utah Fuel Company was broken and the favorable economic conditions of the times led to the opening of many new mines in the Carbon-Emery fields. The first large "Independent" mine, appropriately owned by the Independent Coal and Coke Company, was opened at Kenilworth in the Book Cliffs east of Helper. The Hiawatha district had its initial development in 1908, soon after Kenilworth, when the West Hiawatha mine of Consolidated Fuel Company and the Mohrland mine of the Castle Valley Fuel Company were opened. These two companies jointly built the Castle Valley Railroad from Price to their mines in 1910,

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[1] Ibid., p. 50.

[2] Ibid., p. 66.

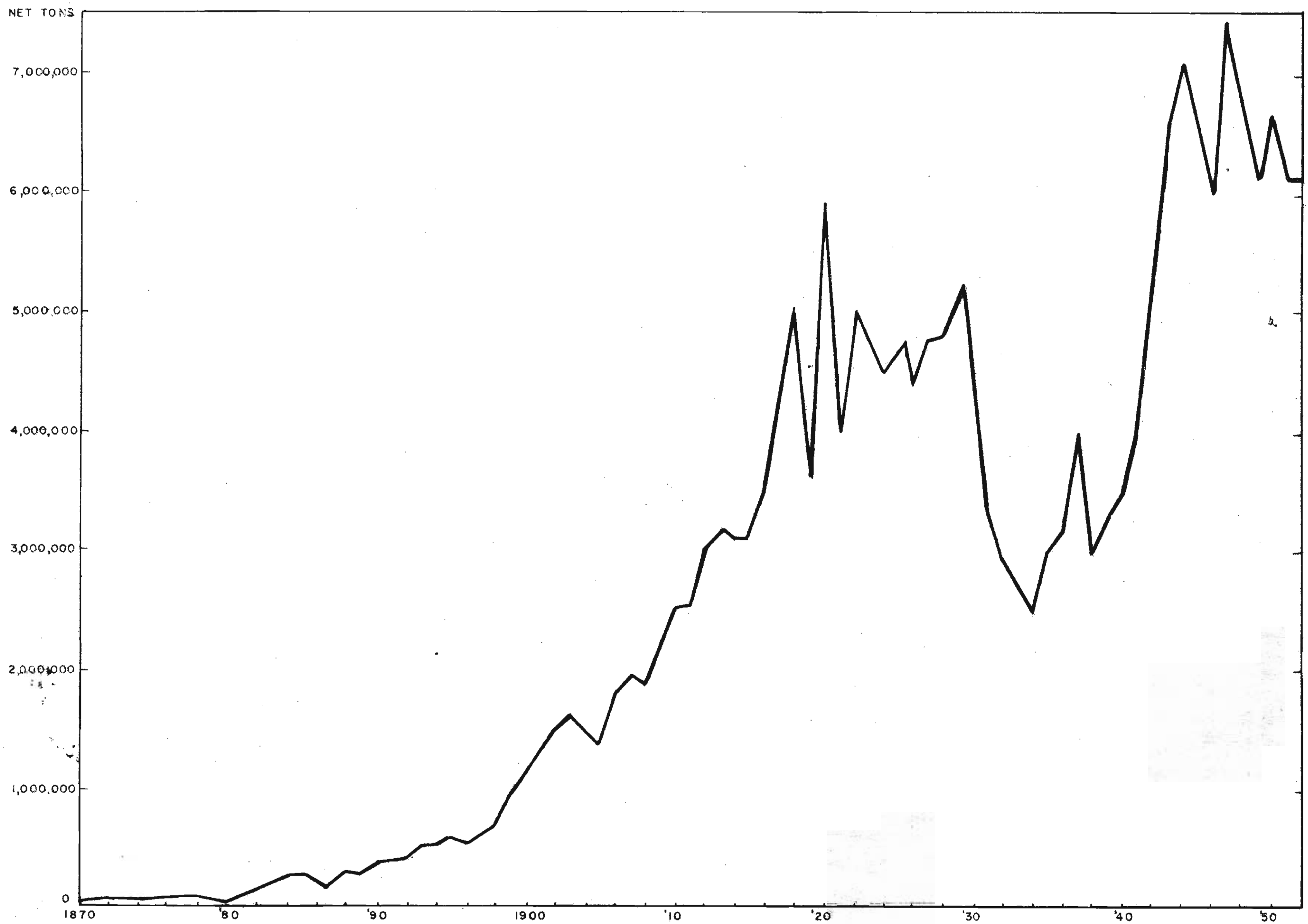

Figure 11, Utah coal production, 1870-1952. (Source: Minerals Yearbook, Various years).

and in 1911 the Black Hawk mine was opened at the site of the present Hiawatha King #1 mine. All the mines in the area were purchased in 1911 by the United States Smelting and Refining Company to insure a fuel supply for their western smelting operations.[1] The United States Fuel Company was organized to operate the mines.

In succeeding years the United States Fuel Company decided to abandon the poorly graded Castle Valley Railroad which connected its mines with the Denver and Rio Grande Western at Price. At the same time the Denver and Rio Grande Western had only a single track line over the Wasatch Plateau and a bottleneck had developed in the transportation of the coal to market. The new line was to parallel the Denver and Rio Grande Western track and free the mines along the Wasatch Plateau from any dependence on the Denver and Rio Grande Western. Construction on the new line, the Utah Railway, was begun at Springville and Hiawatha in 1913. The Denver and Rio Grande Western officials soon realized the effects a competing line would have on their coal trade. The two lines soon reached an agreement, whereby the Utah Railway would build its line from Hiawatha to a junction two miles north of Helper (Plate V), and a track paralleling the then existing Denver and Rio Grande Western track from Springville to Thistle.

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[1] Daughters of Utah Pioneers, Centennial Echos from Carbon County, (Price, Utah: Daughters of Utah Pioneers, 1948), p. 214.

The Denver and Rio Grande Western would double track the remainder of its line over the Wasatch Plateau, and eliminate some steep grades near Soldier Summit. The two companies then shared in joint trackage rights over the line.[1]

In the years just preceding and during World War I operations began in the Spring Canyon district. Several wagon mines were opened early in this area but real development awaited the construction of a branch line of the Denver and Rio Grande Western Railroad into the district in 1912. Settlements were established and development work was begun and the mines began shipment as soon as the railroad was finished. During the war years several more mines were opened in the area, including Rains, Peerless, and the Latuda mines.[2]

No further significant expansion of mining capacity occurred in the coal fields until 1922, and in the next four years several new mines were opened. Castlegate No. 3, the first shaft mine in Utah, was opened in 1922. It could not compete with the more economical drift mines and it closed after a few years of operation. The Gordon Creek district, with the Consumers, National and Sweet Mines, was opened in 1923. A branch of the Utah Railway was built into the area soon after it was opened. The Columbia mine, south of Sunnyside, was opened in 1925 to provide coking coal for

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[1]Johnson, op. cit., p. 84.

[2]Daughters of Utah Pioneers, op. cit., p. 221-235.

the Ironton blast furnace south of Provo.[1]

During this period of expansion the annual production climbed from 1-1/2 million tons worth 2-1/2 million dollars in 1906 to over 5 million tons worth 12-3/4 millions of dollars in 1929. The labor force had more than doubled in the mining industry during the period. Production and employment had dropped from the peaks of the war and early post-war years but both had made enormous gains since the beginning of the period (Figures 11 and 12).

Depression - World War II Period

The great depression that plagued the United States all through the 1930's had a severely repressive effect on the coal industry. The industrial market was severely curtailed and at the same time natural gas for the first time began to compete for the domestic market in northern Utah. These and other reasons caused reductions in production and employment which were not counteracted until World War II. In 1934 production fell to two and one-half million tons; the lowest output in the Utah coal fields since 1910. Employment reached its low of 2500 workers in 1939.

The number of mines in operation during the depression varied from year to year as a result of changing business conditions but the entries and exits of companies from the scene were mostly by the small wagon and truck mines. The only large mine opened during the period of the depression

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[1] Madsen, C. H., History of Carbon County, (Price, Utah: Carbon County Board of Education, 1947), p. 34.

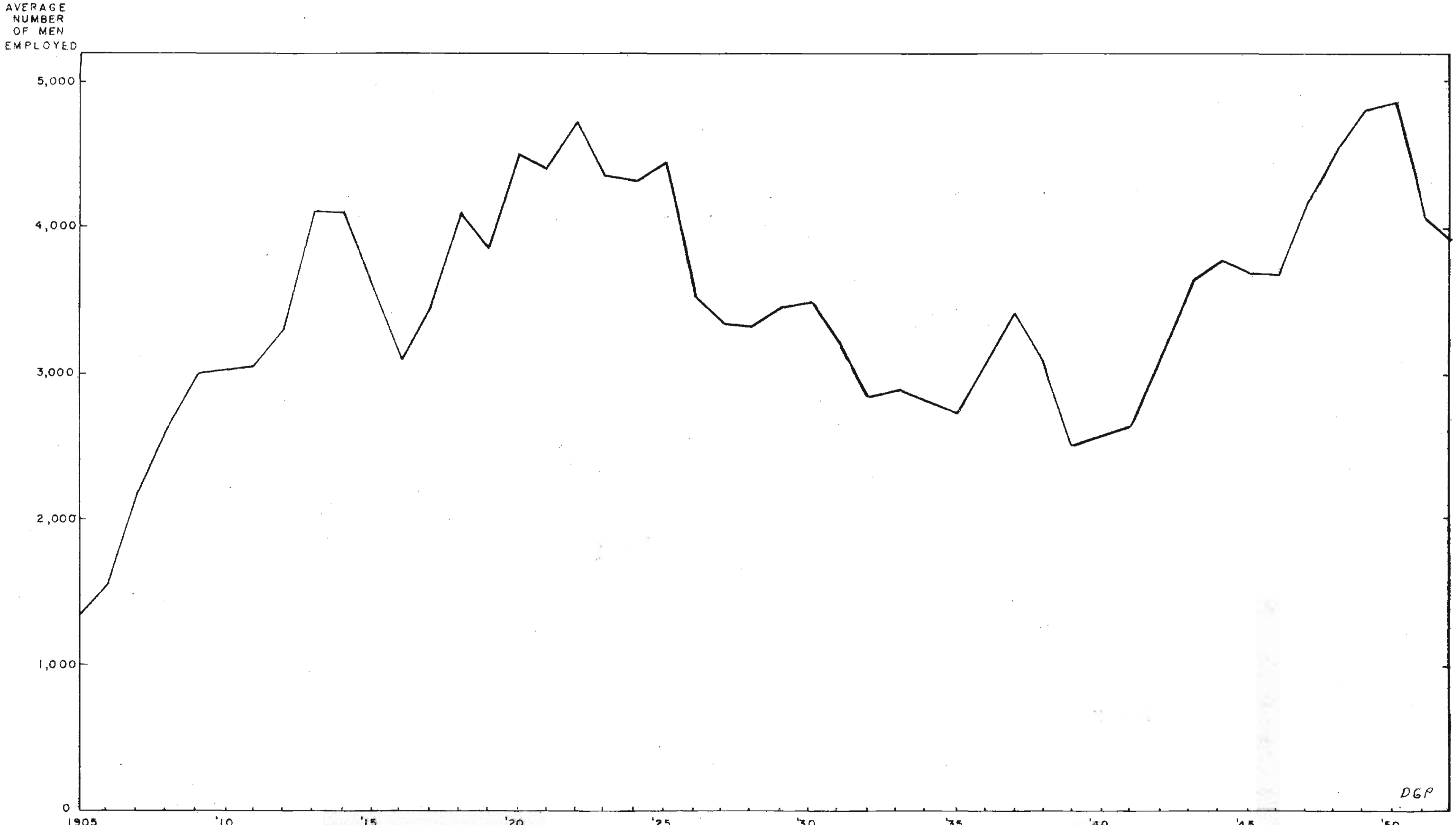

Figure 12, Average number of employees in Utah Bituminous coal industry, 1905-1952. (Source: <u>Minerals Yearbook</u>, Various years).

was the New Peerless mine opened in 1930 north of Castlegate. It only operated a short time before it was abandoned and has never been reopened.

In addition to the general slowdown which the industry experienced during the depression, two other factors were introduced that had a profound effect. The first was the miners union, the United Mine Workers of America. After many years of strife and bitterness the union was able to organize the majority of the miners in Utah under the provisions of the National Industrial Recovery Act of 1933. The second factor, the almost complete mechanization of the Utah mines, was partially the result of the first. Mine machines had to be introduced to reduce production costs by producing more coal per man per day.

World War II revived coal mining in Utah. The tremendous increase in industrialization on the Pacific Coast and in the Intermountain Region produced high demands for fuel and resulted in the record production of 7 million tons in 1944. The greatest single addition to the mining capacity of the State resulted from the building of the Geneva Steel Plant near Provo. Development work on the Horse Canyon mine began in 1942 and by the time the steel plant was completed the mine was producing coking coal in large quantities. This mine is now the largest single producer west of the Mississippi River.[1] The completely new town of Dragerton, with over 800 homes, was constructed to house the workers for the new mine and it is a model

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[1] Ibid., p. 38-39.

of the new type of coal mining settlements.[1]

The years following World War II were a time of almost continuous labor strife in the Utah coal fields. Long strikes occurred in 1946, 1947, 1948, and 1949, causing much hardship to both the consumers and miners and severely affected the markets for coal. Many of these strikes were nationwide while others just affected individual mines. A total of 38 stoppages for labor disputes were recorded in the 1945-52 period.[2]

In 1950, after sixty-eight years of operations, the Utah Fuel Company withdrew from the Utah coal industry. The Sunnyside mines numbers 1, 2, and 3 were sold to the Kaiser Steel Corporation and the Castlegate and Clear Creek mines were sold to the Independent Coal and Coke Company.

The Korean emergency caused an increase in production, but with the end of hostilities production has declined slightly. Much of the market for coal has been lost to other fuels since World War II and this combined with two mild winters has caused a serious unemployment situation to develop in the mining industry.

The development of the Utah coal industry was slow and scattered in its early years. The major handicap was the lack of adequate transportation between the coal fields and the centers of population. The construction of the Utah and Pleasant Valley Railroad and later the Denver and Rio

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[1] Borovatz, Steve Nick, "The Settlement of Carbon County and The Development of Schools," Unpublished Masters Thesis, Dept. of Educational Administration, University of Utah, 1953, p. 69.

[2] Clark, Joseph C., Jr., "A History of Strikes in Utah," Unpublished Masters Thesis, Dept. of Economics, U. of Utah, 1953, p. 22-24.

Grande Western Railroad opened the way for the development of the eastern Utah coal fields. The first quarter of the twentieth century was a period of great expansion in the industry with the Utah capacity increasing several times. The depression period brought many problems and changes to the industry but the most important were the unionization of the mines and the introduction of mining machines in the Utah mines. World War II revived the industry but the continued labor turmoil and loss of markets has put industry in a serious condition today.

CHAPTER FOUR

OPERATIONS AND PRODUCTION

The bituminous coal mining industry, like any other in our modern industrial society, is confronted with a multitude of problems that constantly harass the coperator. Unlike other industrial establishments the operator is limited in his selection of sites. He has to go where the coal deposits are located. Once he has obtained, by purchase or leasing, control of a sufficient amount of coal lands to justify the opening of a mine, the operator must plan the development of the mine so as to extract the maximum amount of coal at the least cost in accordance with the resource conditions of his mine. The mine owner must decide which type of mine opening will be best for his particular area, the pattern of development of the mine, the amount and types of machines that can be best utilized. He must make provisions for safe mine practices and educate the miners in safety procedures to comply with state and federal mine safety laws. Coal cleaning and preparation plants must be provided, where necessary, to improve the quality of the coal and arrangements for marketing the coal must be made. In addition he often provides homes and community services for the miners he employs.

Types of Mines

In deep mining the type of opening used is determined largely by the topography, position of the outcrop, and the depth or thickness of the overburden. An underground mine can be opened: (1) By driving a more less level tunnel, called a drift, into the coal bed; (2) by driving an inclined entry, called a slope, down to the coal bed; or (3) by sinking a vertical shaft down to the coal level. The first two methods are favored in hilly or mountainous country, such as prevails in the Utah coal fields, and the third in flat country.

A large majority of the coal mines in Utah are drift mines as a result of the more favorable topographic and geologic conditions. The outcrop of the coal beds on the face of the escarpment, sometimes at considerable height above the valley floor, the gentle dip of the beds into the mountains, and the dissection of the cliffs by streams have made conditions for drift mining very favorable.

The drift mine is usually opened near the bottom of a canyon where the coal bed intersects the stream bed as the strata dips into the mountain. This leaves the maximum amount of coal above the level of the main entry and gives a favorable downhill route for loaded mine cars in this section of the mine. The main entry to the mine is driven from the surface along the strike of the bed or by a rock tunnel to an intersection with the bed and then along the strike for the length of the property. The main entry divides the dip workings on the down-slope side from the raise workings on the up-slope side. At intervals varying from 2000 to 3500 feet entries are made at a 90° angle from the main entry up and down the dip of the bed. Along these slope and raise entries, strike entries are driven at a 90° angle every

200 to 300 feet separating the mine into panels. Rooms lead from the strike entries at intervals determined by the size of pillar. These are the centers of mining activity and it is here that most of the operations in the mining cycle take place (Plate VI).

The room-and-pillar system of mining has become the prevalent type of operation in the Utah coal fields. Under this system miners are isolated within a circumscribed space in which they work and they are dependent upon their own abilities to complete the basic tasks of timbering, or bolting, drilling, blasting, and loading. As coal mining has become more mechanized the individual miner who was formerly responsible for all of the operations in his particular section, has been replaced by a team in which each member has his own specialized task to perform.

It is the custom to drive the entries and rooms to the property line or until it is no longer economical to operate in an area because of thinning of the seam, distance from the tipple, or any other reason, then the retreat from the area is begun. On the retreat the pillars and top coal left as roof support on the advance are removed and the roof is allowed to cave. The collapse of the roof in worked out areas is allowed because it is believed that this takes some of the pressure off of the roof in areas of continuing operations.

The Mining Cycle

The mining of coal was for many centuries a hand operation with

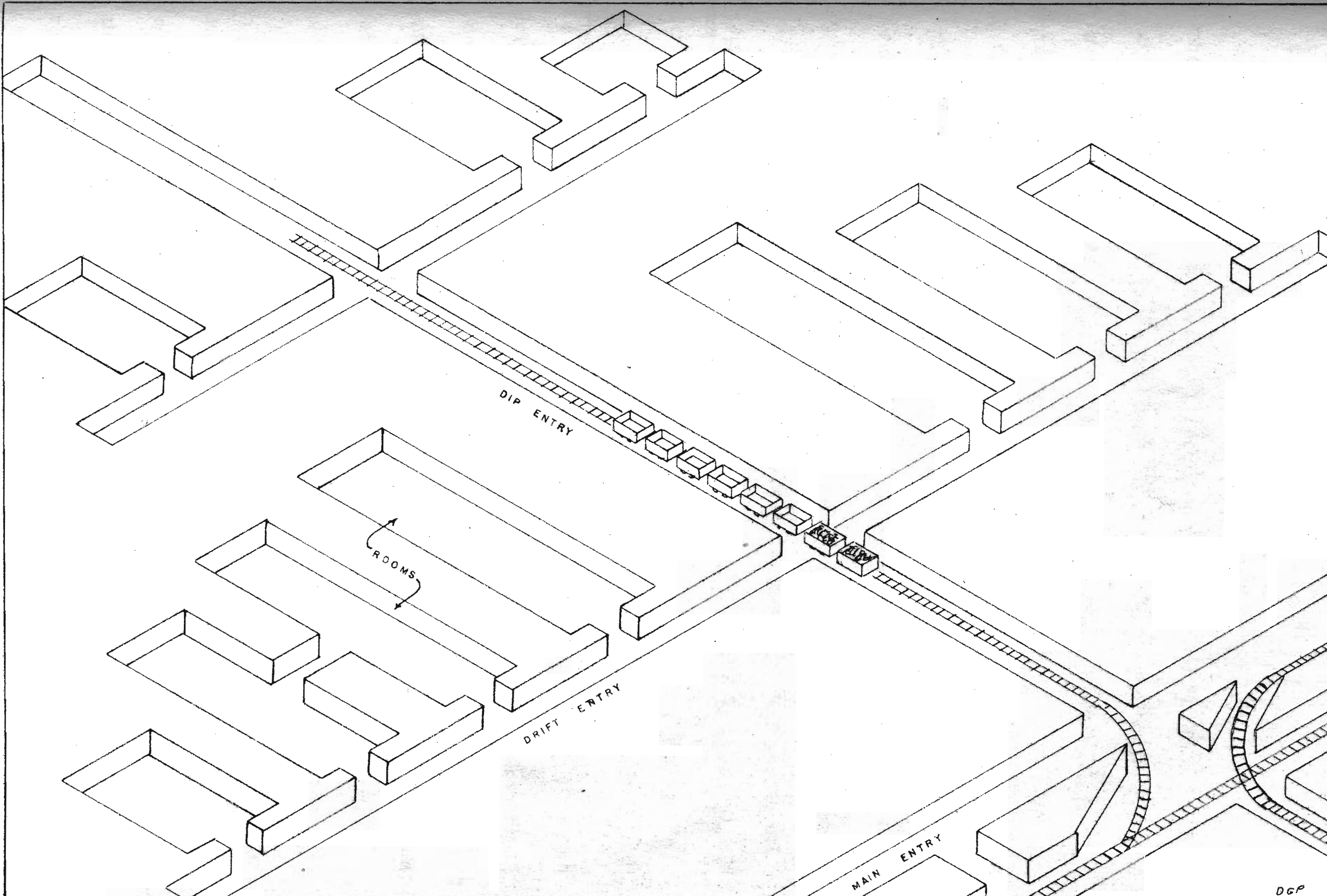


PLATE VI, Cutaway drawing of a typical bituminous coal mine.

the pick and shovel and a little blasting powder as the only tools. The cutting, loading, and hauling of the coal in the early mines was a tedious and backbreaking operation, and it was not until the last 75 years that hand tools were widely replaced by machines.

The past half-century has witnessed greater technical changes in the mining of bituminous coal than all its previous years combined. In underground mining nearly every phase of the operating cycle has been mechanized. In the modern mine the coal is undercut by electric machines, electric drills prepare the coal for blasting, an electric charge sets off the blast, electric loaders clean up the coal and load it into mine cars or conveyors for its trip on electric trolley railroads to the electrically powered preparation plant at the tipple.

The modern coal mine is a large, scattered operation involving co-ordination of many men and machines to recover the maximum amount of coal at the minimum cost. Much like a factory, a mine must have all operations of the mining cycle coordinated to the utmost, but the scattered nature of the operations makes an efficient transportation and communications system essential.

Besides activities that deal directly with recovery of the coal, mining includes auxiliary services necessary to the proper functioning of a mine. Underground mining involves cutting, drilling, blasting, and loading the coal, and hauling it to the tipple where it is prepared for market, sometimes in an elaborate cleaning and preparation plant. Other essential tasks include timbering or bolting, ventilating, pumping, supplying power, and maintenance of machines and mine. Many of these auxiliary tasks are performed to comply with federal and state mines safety laws.

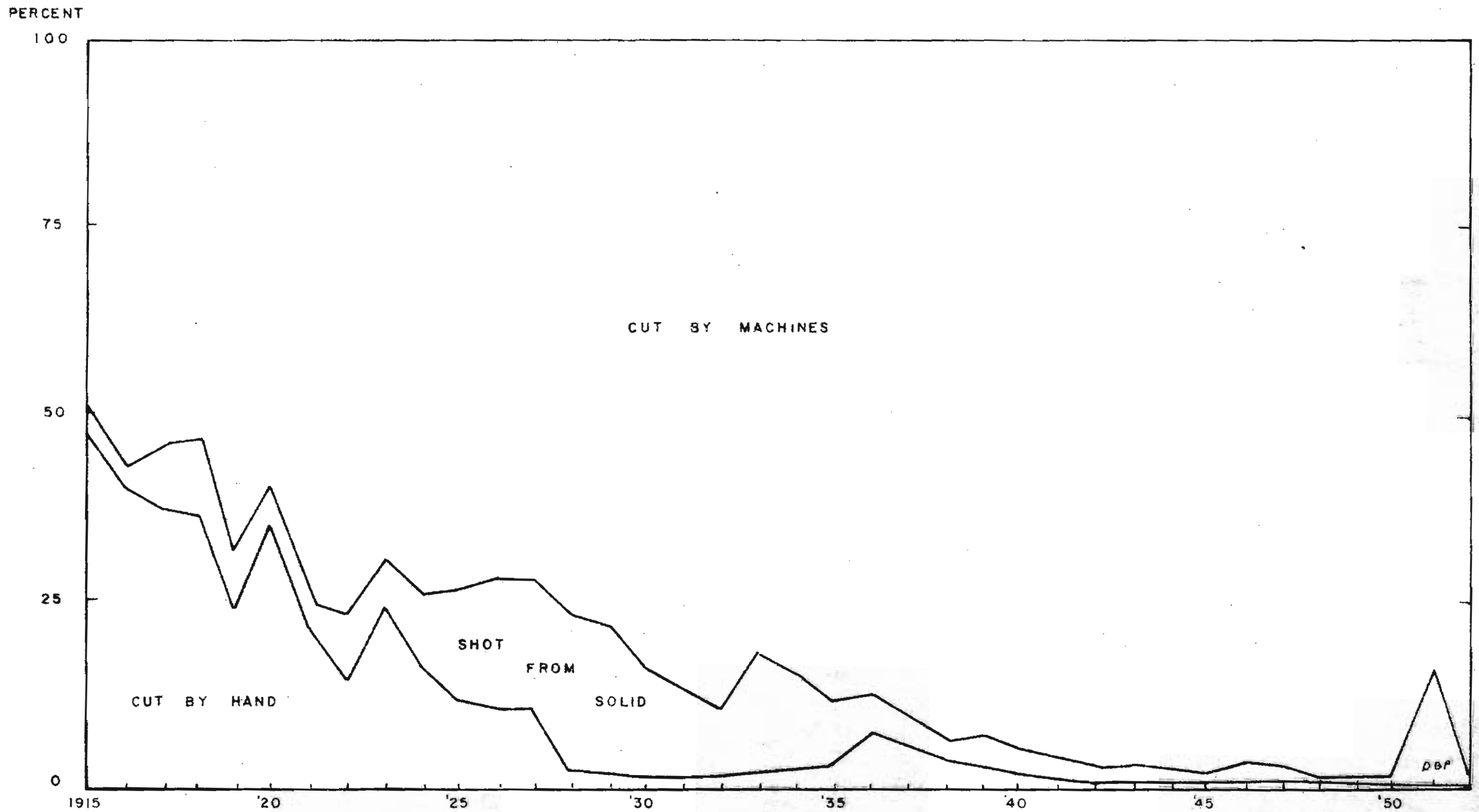
The mining cycle begins with the cutting, drilling and blasting of the coal to break it down from the seam. The coal face toward which the mining process is directed constitutes a solid vertical wall, the height being equal to the thickness of the seam, or in thick seams to a height that is safe to remove. The coal can be blasted from the solid face of the seam without any advance preparation of the seam itself. However, the heavier charge and the greater resistance when seams are blasted uncut increase the shattering effect and result in an excessive amount of fine coal. There is also the danger that shots will blow out of the drill hole and ignite the coal dust or gas. This method, called shooting off the solid, is still used to some extent in Utah, usually in removing pillars.

Dangers incident to shooting off the solid, together with the degradation resulting from using a large charge of explosive, have led to the practice of undercutting the seam in order to give room for expansion when the charge is fired. Instead of shattering the coal the blast seems to push the coal away from the seam with the minimum of shattering. The undercutting of the seam is almost a completely mechanized operation. The method most used in the Utah mines is to make a horizontal cut along the bottom of the seam completely across the room and a vertical cut in the center of the face about half the height of the seam.

The cutting machines in use today are electrically powered, with a heavy plate known as the cutter bar, extending out in front of the machine. Around the outer edge of the plate is an endless chain fitted with removable steel bits. In operation the revolving chain is forced against the coal to make the cut. The bar can be rotated on its axis to make both the horizontal and vertical cuts. There are many variations of this basic pattern to meet the conditions of the various mines. Machines are track mounted for track equipment mines, mounted on rubber tires for trackless mines, and the shortwall type, a small cutter adapted to use in small mines, which is dragged or hauled from location to location. The size of the carriage is also variable for use in thick or thin seams. The use of cutting machines has increased yearly in the Utah coal fields and in 1952, 99 per cent of the coal mined was cut by machines (Figure 13).

In preparation for blasting a series of holes are drilled in the face to the same depth as the undercut. The drilling operation is almost completely mechanized. In the Utah mines drilling is done by electric drills mounted on rubber-tired carriages, by post-mounted drills or by hand drills. The blasting of the coal from the seam has long been one of the most dangerous operations in coal mining. Gunpowder and later dynamite were first used but the frequency of mine disasters from blasting led to the development of flameless and permissible explosives.[1] The use of

[1]A permissible explosive is one which has passed certain tests conducted by the United States Bureau of Mines to determine if it meets specified safety regulations. The word permissible refers not only to the explosive itself but to the method of using the explosive underground.



Figur e 13, Percentage of Utah coal mined by various methods, 1915-1952. (Source: Minerals Yearbook, Various years).

explosives is not permitted in gaseous mines, therefore compressed air or carbon dioxide is used as the blasting agent.

The preparations and shooting of the charge is carried out by highly trained shoot firers who must be certified by the Utah State Industrial Commission. The drill holes are loaded and the charge is fired between shifts in the larger mines and during lunch periods or between shifts in the smaller mines. This procedure is followed not only for the safety of the miners but it also provides a supply of coal ready for loading when the next shift begins work.

Machine loading devices are not used in as many mines as drilling and cutting machines; 13 mines loaded by hand in 1952, but over 99 per cent of the total Utah production was loaded by machines. The mining machines in use today are built with two rotating gathering arms which pick up the coal after it has been blasted off the face and pull it onto a conveyor. The loaders are mounted either on caterpillar tracks or a railroad carriage for moving them in the mine. As with the cutting machines the size of the loaders is varied to suit the conditions of the seam. The use of loading machines became extensive after union organization of the mines in 1933. Union organization raised wages and production costs so loading machines were introduced to increase output (Figure 14).

Mine haulage, or the transportation of the coal from the place it is mined to the surface where it is prepared for market, is an essential and involved process in most Utah mines. The layout of the mine, as outlined

Figure 14, Loading of coal in Utah, 1925-1952.
(Source: Minerals Yearbook, Various years).

previously, is designed to provide the best possible means of transporting the coal. From the rooms where it is first loaded the coal is hauled to the strike entries by means of conveyors or shuttle cars; here it is placed in mine cars for its trip to the dip or raise entry where it is lowered or raised to the main entry by a hoist. In the main entry the cars are made into trains of 10 to 20 cars and hauled to the surface. In some Utah mines the gathering of the coal is now done almost completely by conveyors (Figures 15 and 16).

The auxiliary services in the coal mine have two purposes, to maintain the mine and equipment, and to provide the maximum safety for the miners. The mechanized nature of mining today has increased costs tremendously so it is essential that the expensive machinery be kept in as good an operating condition possible. Most mines keep a force of trained repairmen and have well equipped repair shops to do the repair work. Some mines even have their shops underground to save time in making repairs. Provision is also made for maintenance work on all machines while they are being used.

In many ways the fields of maintenance and safety coalesce for the constant maintenance of the equipment is necessary to insure mine safety. It is in the field of mine safety that government regulation has entered into the mining industry the most. The rules and regulations for the safe operation of coal mines in Utah are said to be the most complete in the nation. The state regulations are made by a committee of the mine owners, miners,

Figure 15. Tipple at terminus of the mian conveyor of the Horse Canyon Mine of the Columbia-Geneva Division, United States Steel Corporation.

Figure 16. Conveyor at Horse Canyon Mine. Stockpile of mine props in foreground.

and members of the State Industrial Commission. After being formulated by this committee the regulations are then made law by action of the legislature. They can be changed from time to time as conditions demand. Both state and federal mining laws cover almost every phase of operations and provide for periodic inspection to insure compliance. The coal mine inspectors have the power to close any mine found to be violating the safety regulations.

Coal Preparation

Since the beginning of coal mining the preparation of coal for market has changed from the simple task of the miner casting aside the impurities found in the seam to a complex process involving expensive machinery. Because buyers have become discriminating and competition among different coals and other fuels more intense, operators find it necessary to process their product to improve its quality and physical appearance. It is interesting to note that while mechanization of mining has reduced production costs, increased mechanization in coal preparation has had the opposite effect.

The simplest system of preparation still involves casting impurities aside by hand as the mine cars are loaded or later as the coal is loaded for shipment at the surface. Such methods must be employed at mines with limited tonnage that cannot afford large preparation plants or at mines whose customers do not demand much preparation. However the trend is toward more and more preparation of the coal before it is marketed (Plate VII).

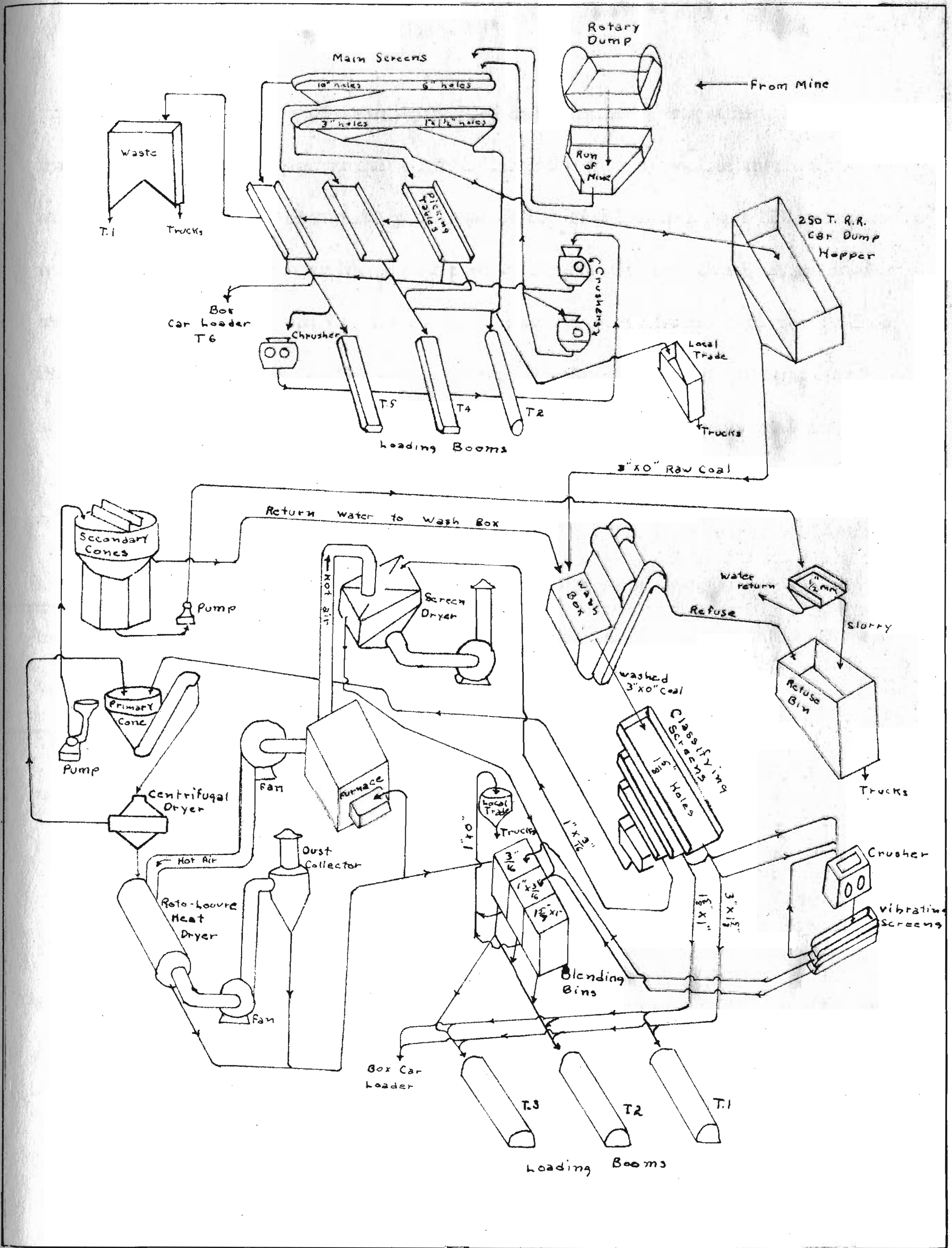


PLATE VII, Flow chart of the combined preparation plant of the Castlegate Mine, Independent Coal and Coke Company.

The separation of mine-run coal into sizes by screening is now the procedure in all coal mines. Official information is lacking on the use of screening equipment but 80 per cent of the total output in 1927 came from mines equipped with screening equipment[1] and with the advances in coal preparation since that time it may be assumed that almost 100 per cent of the output is now screened. The screens in use vary from simple bar screens to mechanical shaking screens that can separate several different sizes.

The importance of cleaning depends upon the original quality of the coal and the demands of the customers. As the practice of buying coal by heat units has grown and competition between coal and other fuels has enlarged, efficient cleaning has become a necessity in major sections of the bituminous-coal industry. The earliest type of cleaning was to have the miner hand pick the coal as it was loaded into the mine cars. With the introduction of mechanized cutting and loading devices hand picking became impractical and the need for increased surface preparation became apparent.

Mechanical cleaning began in Utah in 1939 with the completion of the plant at Hiawatha by the United States Fuel Company[2] and the building of a plant in 1939-40 at Castlegate by the Utah Fuel Company[3] (Table 3).

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[1] Mineral Resources of the United States, 1929, Pt. 2 Non-metals, U.S. Bureau of Mines.

[2] U.S. Fuel Company, Thirty Years of Coal Mining, (Salt Lake City: U.S. Fuel Company, 1946), p. 19.

[3] Robbins, J. Spencer, The Mechanical Preparation of Coal with Special Reference to a Utah Plant, Unpublished Bachelor of Science Thesis, Dept. of Mechanical Engineering, University of Utah, 1941, p. 21.

Table 3

MECHANICAL COAL CLEANING IN UTAH 1939-1952

Year	No. of Plants	Tons Cleaned	% of Utah Output Cleaned
1939	1	a	a
1940	2	a	a
1941	3	1,042,679	25.6
1942	3	1,413,048	25.6
1943	2	839,111	12.6
1944	3	2,064,798	29.0
1945	3	1,682,138	25.2
1946	3	1,636,201	27.3
1947	3	1,679,577	22.6
1948	3	2,134,386	31.3
1949			
1950	6	2,312,384	34.7
1951	6	2,039,335	33.2
1952			

[a]Figures not published

Source: Minerals Yearbook 1941, 1944, 1947, 1950, 1952

Today the largest mines of the State have elaborate cleaning plants and 40 per cent of the total Utah production is mechanically cleaned. Some operators feel that the purity of the seams they work is high enough that extensive cleaning is unnecessary and only if it should fall will they install cleaning equipment to keep their markets.[1]

All the common mechanical-cleaning devices utilize the difference in specific gravity between coal and the impurities to be removed. A clean and rapid separation of coal and rock impurities can be accomplished by

[1]Garff, N. Odett, General Sales Manager, Spring Canyon Coal Company, Personal Interview.

passing the mixture through a rising current of water so controlled that the upward force is strong enough to lift the coal but too weak to lift the waste products. The coal is carried over a discharge point and the impurities sink to a trap in the bottom where they are removed.[1] Most plants have provision for drying the washed coal.

Special treatments of coal before it is marketed are generally the application of oil or chemicals, crushing, and rescreening of the sized coal. Oiling or the addition of chemicals is for the purpose of reducing dust and preventing freezing in transit. The increase in crushing is a result of the expanded demand for stoker coal and the reduced consumption of lump and nut coal in domestic and industrial heating. Rescreening is an attempt to keep the quality as high as possible despite breakage resulting from handling between the original screening and loading.

In the course of the mining and preparation of the coal many sizes are produced and some of these are in much greater demand than others (Table 4). In the process of producing the sizes most in demand it is impossible not to get some smaller sizes as well. If it is lump or nut coal that is in demand production will be concentrated on these and the remaining smaller sizes will be dumped on the market by the producers in the hope of getting as high a price as possible. With the increased use of stoker-fired burning units this problem has become less important, in fact, the coal produced today is often crushed in the preparation plants

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[1]Hotchkiss, op. cit., p. 34.

Table 4

DISTRIBUTION OF COAL BY SIZES SOLD BY UTAH OPERATORS

Sizes	1946 Tonnage	%	1952 Tonnage	%	Per Cent Change 1946-1952
Lump 1 5/8" x 10"	1,115,448	20.0	493,039	16.6	-3.37
Stove 3" x 8"	342,046	8.3	11,881	.4	-7.89
Egg 1 5/8" x 10"	24,474	.7	11,589	.4	- .26
Nut 1 5/8" x 3"	426,922	10.3	165,114	5.6	-4.77
Dust-Slack 3/16" x 1 5/8"	1,785,812	43.2	1,944,819	65.5	22.33
Straight mine run	97,495	2.2	--	--	-2.36
8" Mine run	206,706	5.0	1,292	.1	-4.96
3" Mine run	421,388	10.3	340,516	11.4	1.26
Totals	4,133,827	100.0	2,968,265	100.0	

Source: Utah Coal Operators Association

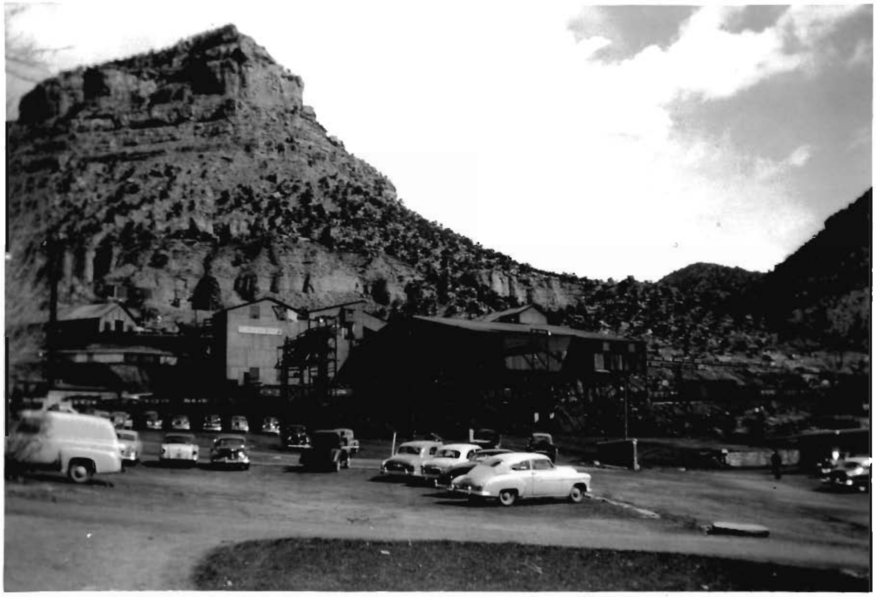

Figure 17. Tipple and coal preparation plant at the Kenilworth Mine of the Independent Coal and Coke Company. Coal is screened and sized here and then shipped to Castlegate where one washing plant serves all three of the company's mines.

Figure 18. Loading railroad cars at the coal preparation plant of the Castlegate mine of the Independent Coal and Coke Company, Castlegate, Utah.

to produce the smaller sizes.

The Seasonal Cycle

The seasonality of production is probably the most serious problem facing the coal industry. The market for coal is seasonal, stockpiling is difficult, and production tends to follow demand. The usual character of seasonal production is a peak in the winter months, October to February, and a low during the summer season (Figure 19). The vagaries of the winter weather in the marketing areas may also have an influence on production. A mild winter, such as the winter of 1953-54, may reduce the demand for coal considerably on the commercial market. The effects of this seasonal curve are most profound in mines where the entire output goes onto the commercial market. Since the production of iron and steel is a constant process the output of coal destined for the coke ovens is not usually affected by seasonal changes. The average monthly production figures for the period 1939-1952 in Utah express this seasonal curve, but since such a large portion of the State's production, 37 per cent in 1952, is destined for consumption in the steel mills the variation is not as great as if all the production went into commercial channels.

The usual effect of curtailed demand for coal in the summer season is: the reduction in the labor force at the mines, lessened production by reducing the number of days worked, and often a complete suspension of operations for a time. The smaller mines that depend on the truck trade

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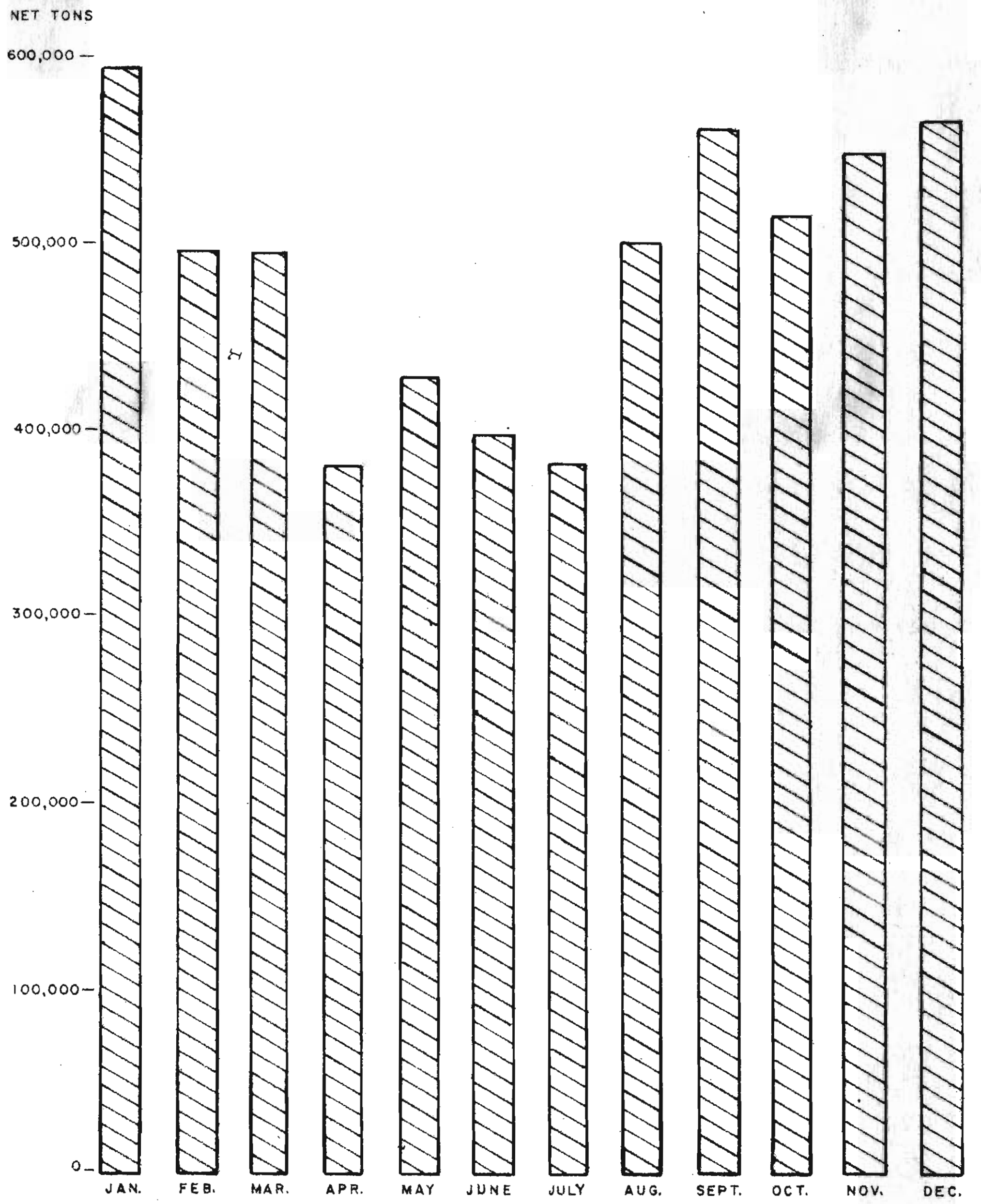

Figure 19, Average monthly coal production in Utah, 1939-1952. (Source: Minerals Yearbook, Various years).

are often closed for several months each year. This is not always the case, however, for some of the small operators, through good marketing practices, are able to keep their operations at a steady level throughout the year. These mines employ a very few miners so that the effect of their prosperity is not reflected in the statewide picture.

Two major problems arise from the seasonality of coal production; they are (1) unsteady employment and pay for the miners, and (2) over-investment in machinery and equipment by the mine owners. The inevitable result of the variable demand for coal is that the mines will be idle for a considerable portion of each year. For the period 1914-1952 the Utah coal mines worked an average of 199 days per year, but the variation from year to year was considerable, ranging from 140 days in 1931 to 301 days in 1944 (Figure 20). Actual shutdowns of the mines for long periods of time are not common. The usual practice is to reduce the work week to two or three days and lay off a portion of the mining crews in slack periods. Thus it can be seen that unless the miner receives a high wage when working and puts a portion of it into savings or has a supplemental income, he may have to depend on some relief agency for a part of each year. The isolated location of the mining centers and the extreme dependency of the area's economy on coal mining make the chances of a miner having a supplemental income very small. If the miner wishes to keep his job he must be available on short notice. Therefore he usually cannot leave the area in search of part time work, and as a slowdown in mining means

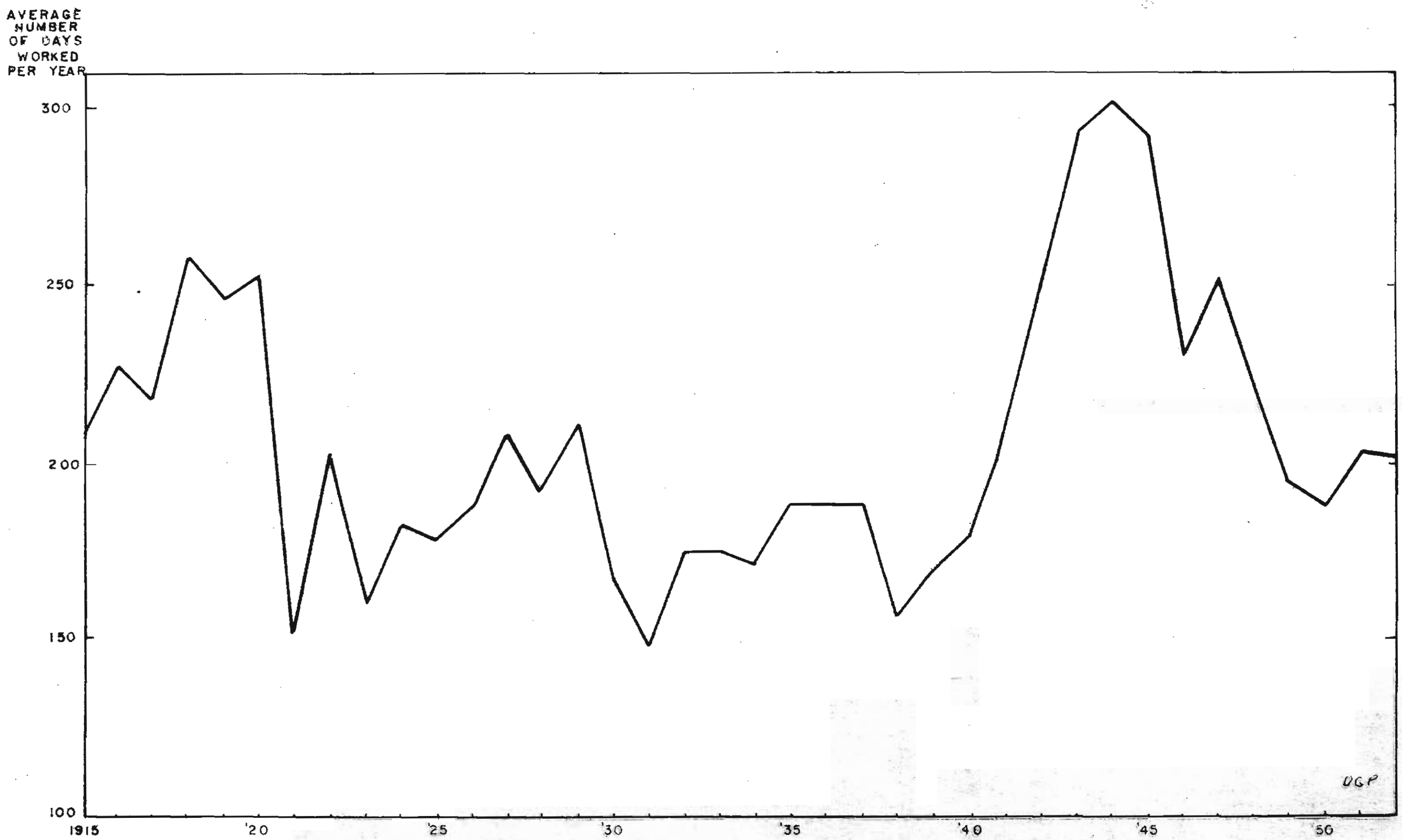

Figure 20, Average number of days coal mines worked in Utah, 1915-1952. (Source: Minerals Yearbook, Various years).

a general business slowdown within the vicinity, local part-time work is practically impossible to find. A few of the miners do engage in farming in the slack season but the acreage of farming land in the valley is limited and most of the mining centers are near the mines at a considerable distance from any agricultural lands. The largest area of part-time farming is in Emery County where the miners in the small truck mines usually live in the farm towns. In most instances, therefore, the unemployed miner is dependent upon state unemployment insurance payments and upon credit, granted by the company for rent, coal, and groceries, to be taken from his salary when he again goes to work.

Excess capacity and over-investment are characteristics of the bituminous-coal industry as a whole, and apply to the Utah coal industry (Figure 21). A number of reasons have been advanced in explanation of these factors. The first basic reason is the seasonality of coal production, with the large amount of expensive equipment which must stand idle for large portions of the year to be able to meet any demands on a short notice. Another reason is the relatively low cost of opening a new mine; these are constantly being opened, especially when general business conditions seem favorable or when a local market for the product may develop. A third reason for the difficulties of the industry has been the sharp rivalry of oil, gas and other competing fuels. In addition, the improvements in fuel efficiency have decreased the quantities of coal required to produce the same amount of heat or energy.

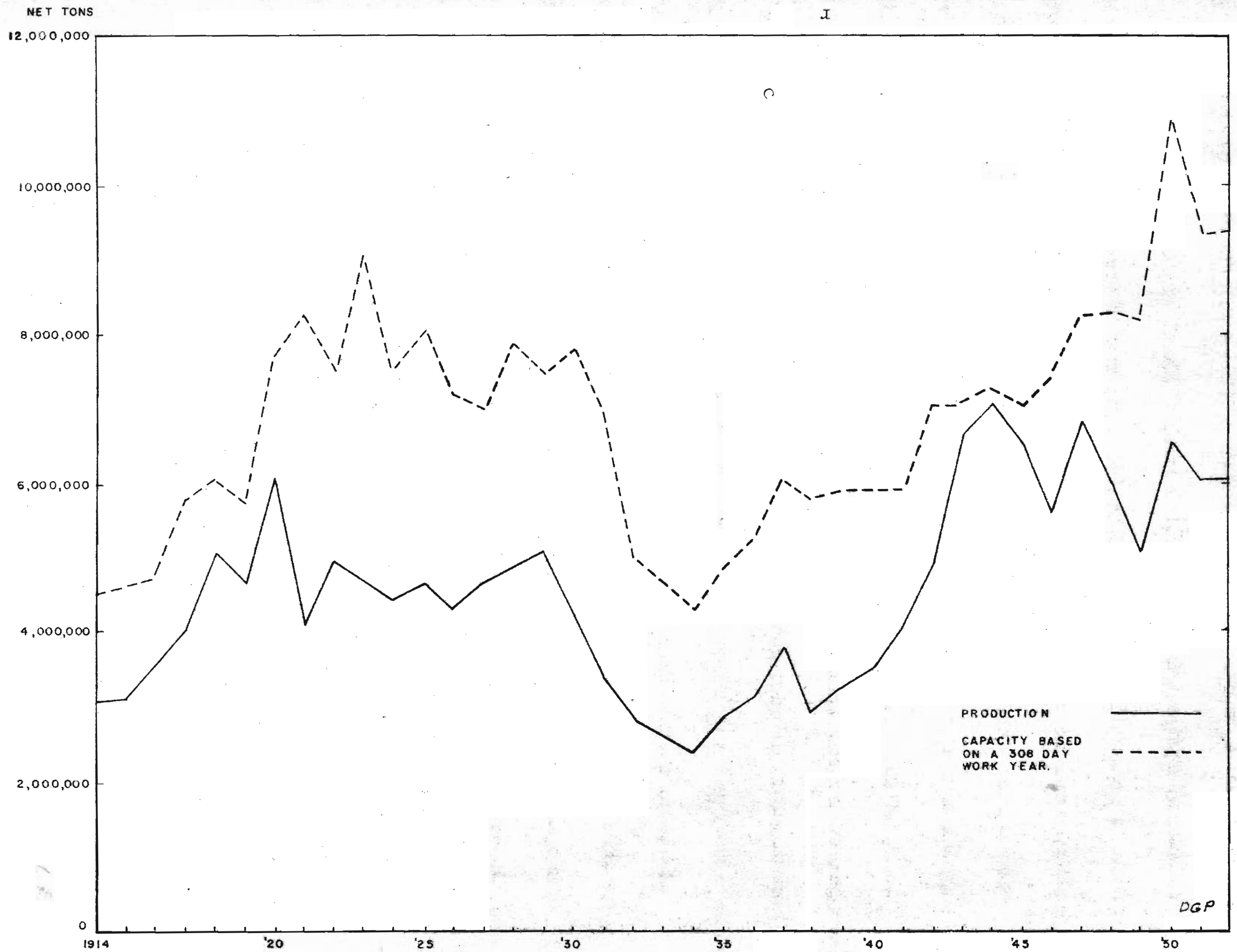

Figure 21, Production and capacity of Utah coal mines, 1914-1952. (Source: Minerals Yearbook, Var ious years).

Ownership and Management

The effects of ownership and management of the mines cannot be ignored in the consideration of the Utah coal industry. The size of a mine and the extent of its production are ultimately limited by the resource conditions of a property, but it is the management that determines the scope of the operations of any company. The type of ownership and the capital backing of the company is important in determining the size of the mine that will be developed. The larger mines are either owned by corporations with a considerable financial backing and a marketing organization capable of disposing of their output, or they are captive mines belonging to the large steel companies in the West.[1] The smaller mines are usually owned by individuals, partnerships, cooperatives or family organizations. They naturally do not have the capital for large operations or rapid expansion. Most of these mines are mechanized but much of their equipment is old or locally made and their development is slow. This small size should not be taken as a sign that these mines are backward in their methods for they are often the most efficient mines in the industry; on the other hand they have no extensive marketing organization and usually depend upon the truck trade to dispose of their output.

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[1]A captive mine is one which is owned by a parent organization and produces coal for a specific use by this organization; e.g. coking coal for the steel industry. The five captive mines in Utah are the Sunnyside Number 1, 2, and 3 mines owned by the Kaiser Steel Company and the Horse Canyon and Columbia mines owned by the Columbia-Geneva Division of the United States Steel Corporation.

The daily and annual output of the mines is closely geared to consumption. The United States Bureau of Mines has for many years published measures of the size of mines based on annual output and from these figures it can be seen that in coal mining, as in many other industries,[1] a few large concerns produce most of the total product (Figures 22 and 23). Though few in number the larger companies are the mainstays of the industry for with their more stable financial base they are less likely to cease operations in hard times although they may impose some reductions. These larger mines, producing 100,000 tons or more, in 1952 produced 87.4 per cent of the coal, although they constituted only 32 per cent of the mines, and employed 3500 miners out of a labor force of 4000 men.

Most of the land underlain by coal in Utah is owned by the federal government, a considerable portion by private individuals or companies, and some by the local government units, usually acquired for delinquent taxes. The federal lands can be leased to develop the coal. The regulations were established by Congress in the Mineral Leasing Act of February 25, 1920 as amended. At the present time the total amount of land that can be leased to any person, association, or corporation is limited to 5120 acres in a single state.[2] The requirements also list minimum standards of development and production and provide for the payment of royalties on the amount of coal produced and rental charges.[3] There are no federal or

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[1]U.S. Bureau of Mines, Minerals Yearbook, various issues.

[2]Title 43, Code of Federal Regulations, Part 193, Sec. 193.2.

[3]Ibid., Sec. 193.10.

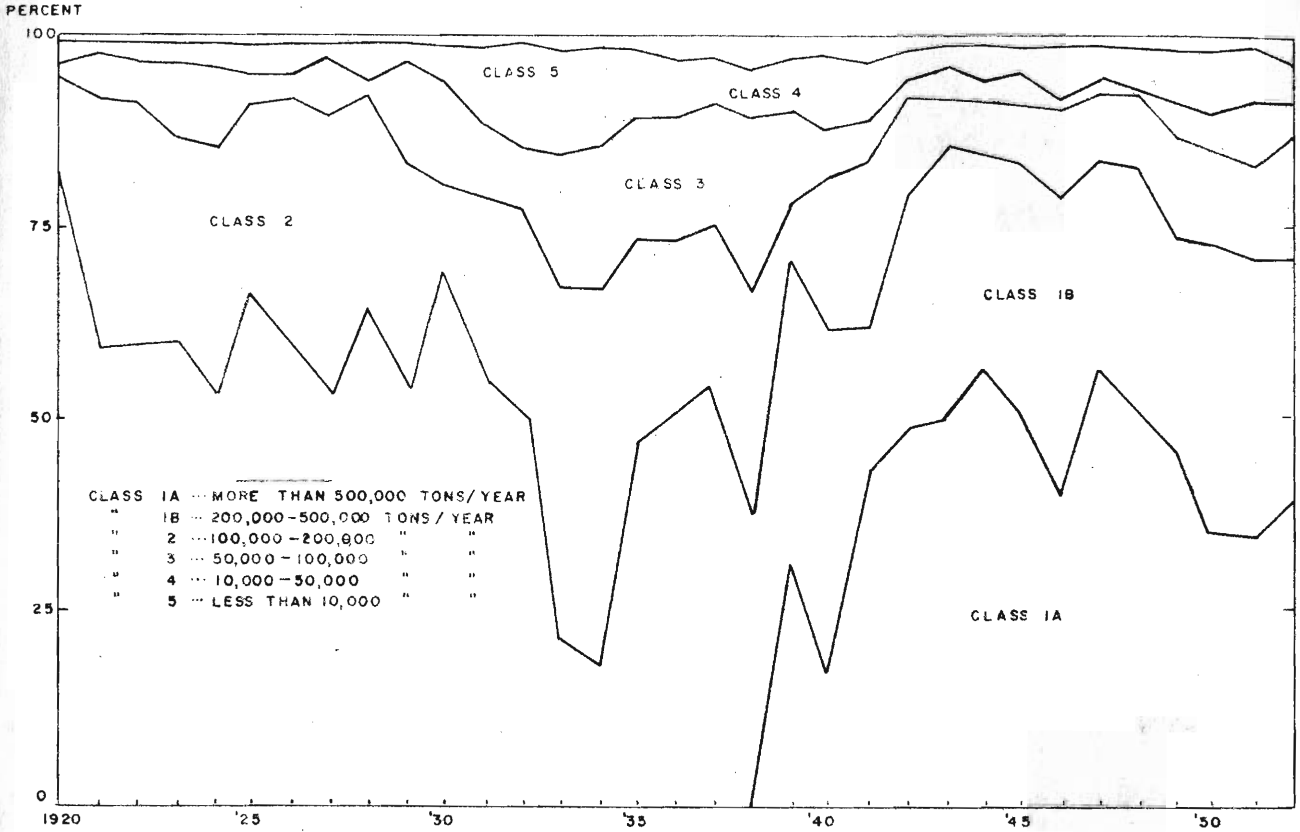

Figure 22, Percentage of coal production by class of mine, 1920-1952. (Source: Minerals Yearbook, Various years).

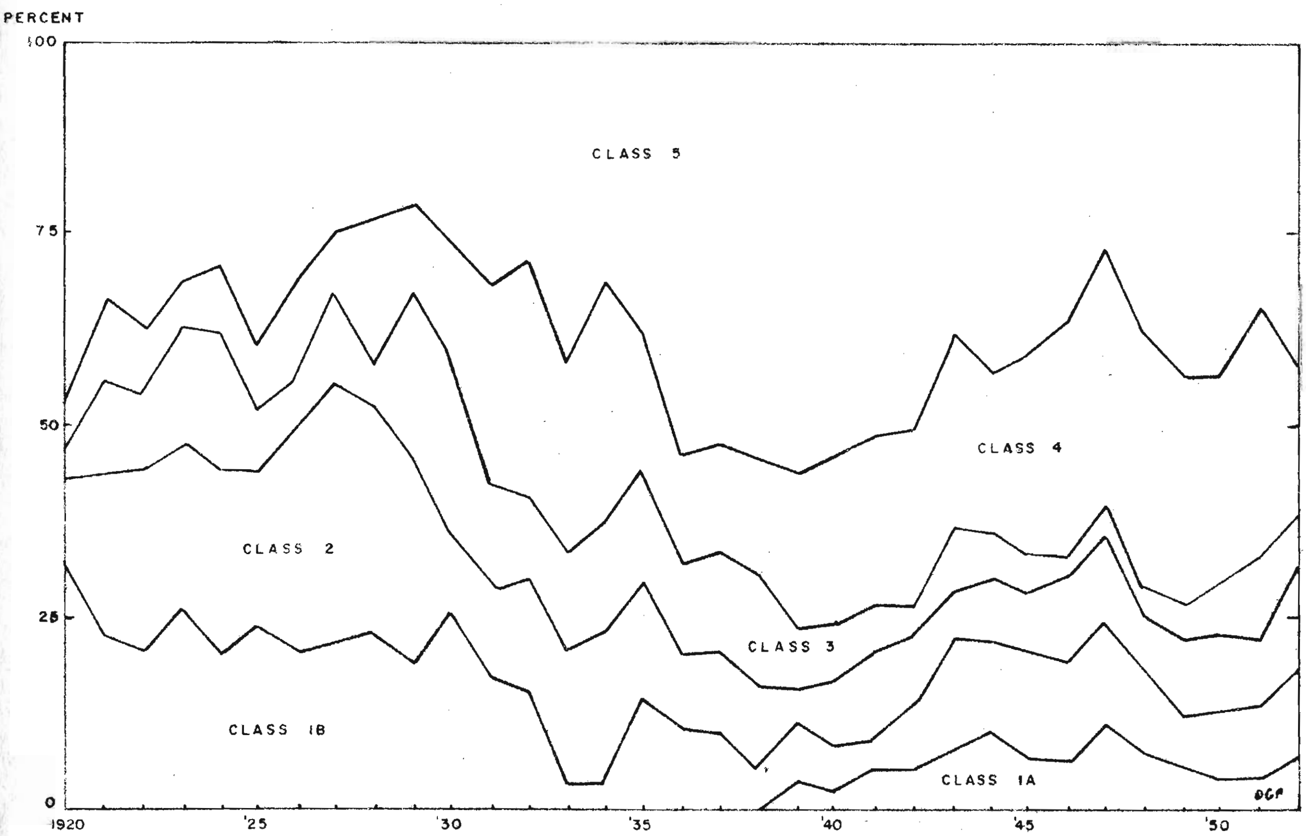

Figure 23, Percentage of mines in Utah by class, 1920-1952. (Source: Minerals Yearbook, Various years).

or state restrictions on the amount of private land a company can own.

The effect of management upon production may be of great importance. Unsuitable mining methods may have a greater drag on output than unfavorable physical conditions. Mine engineers and management must direct development and operations so that technology is advantageously adapted to the physical conditions encountered. This responsibility is continuous since plans are constantly modified and mining methods soon become obsolete unless they are periodically reviewed. This exact balance between the capacities of mining technology and resource conditions is seldom attained but it is the goal toward which all managerial effort should be aimed.[1]

The general efficiency of the overall organization is likewise important. The work of the superintendent, foremen, and technical employees is as essential as that of the miner. The general superintendent is responsible for actual mine operation, but policy decisions, production schedules, marketing, and the decisions on when to shut down or when to commence operations are the responsibility of the main office.

<u>Utah and Western Production</u>

Although the Utah production rate is now high, the level of output appears to have stabilized at about six million tons per year. Despite the

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[1] Hotchkiss, <u>op. cit.</u>, p. 83.

increased population and industrialization in the Utah coal market area, the markets created by postwar expansion have been taken up by natural gas and fuel oil. In addition there have been great improvements in coal-burning equipment, giving marked savings in the amount of coal needed to generate the same amount of energy as formerly.

A closer examination of Utah production, by counties and coal fields, reveals the market concentration of coal production in a few areas (Figure 24). The Book Cliffs and Wasatch Plateau fields include all the production of Carbon, Grand, and Sevier Counties and the great majority of the Emery County production. This area produces over 97 per cent of the coal mined in the State. The better mining condition, higher quality coal, and more adequate transportation facilities give these two fields a decided advantage over the other producing areas of the State. The coal seams are thicker and more continuous and the mines in these fields, particularly those in Carbon County and the adjacent areas of northern Emery County, are closer to the large consuming markets and have access to railroad transportation.

Trucking has increased production in the Wasatch Plateau and Book Cliffs as well as in many other areas, while it has cut the production in areas of low quality coal by enabling good coal to be placed on the local northern Utah markets in competition with the sub-bituminous Coalville coals.

As with any other industry in this age of national markets and

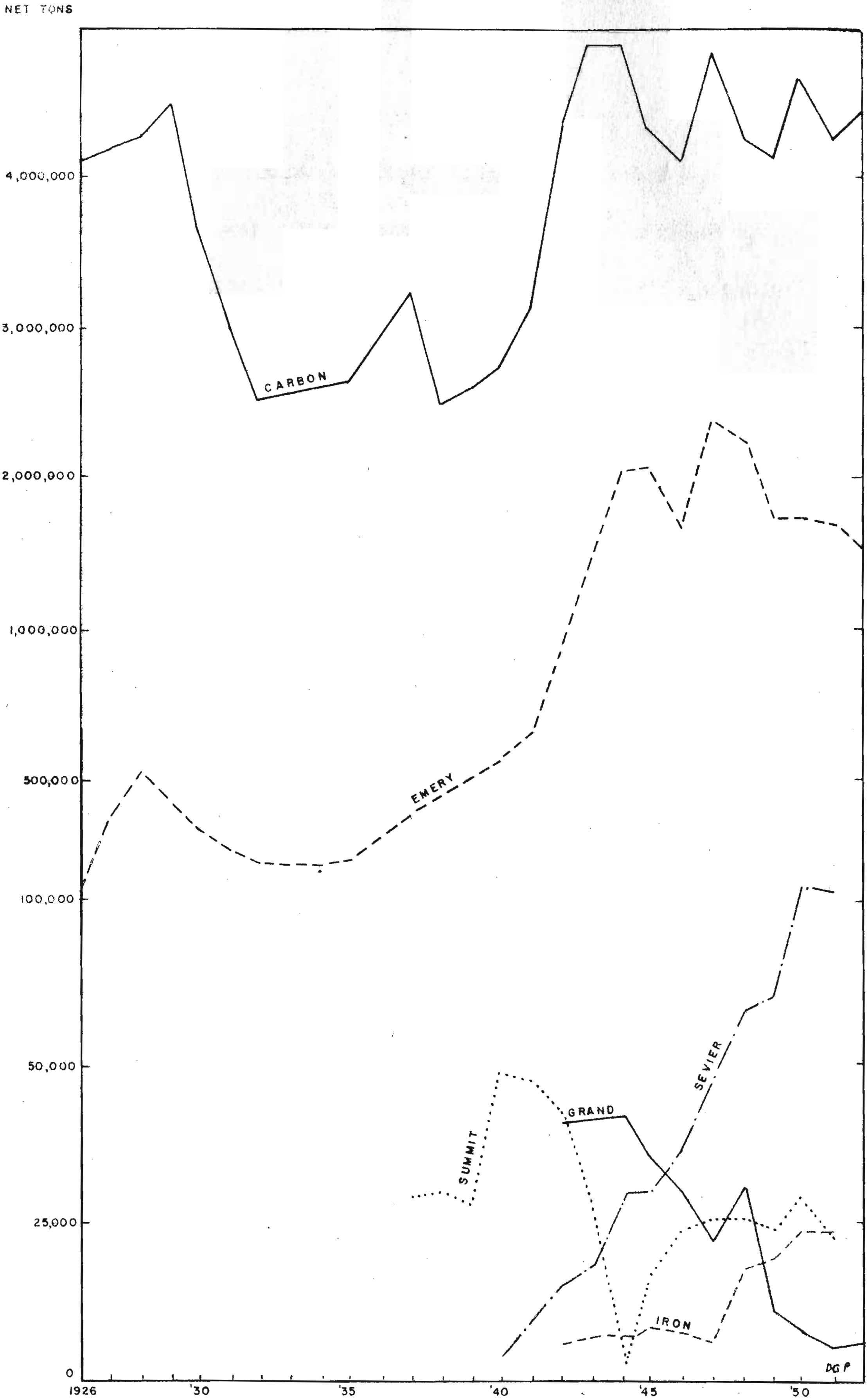
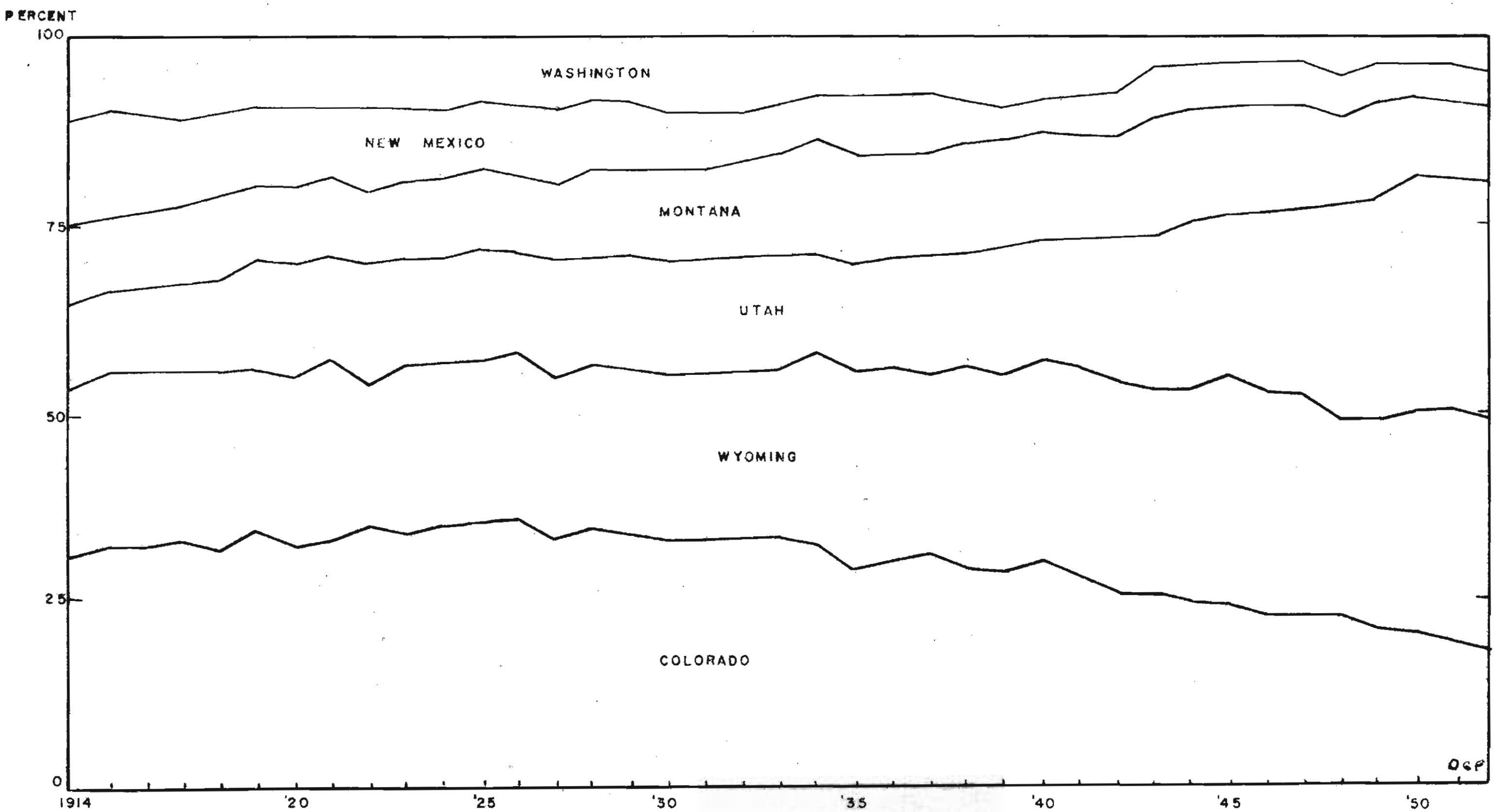


Figure 24, Utah coal production by counties, 1926-1952. (Source: Minerals Yearbook, Various years).

national competition the Utah coal industry cannot be viewed as an isolated phenomenon of only statewide importance. When nearly one-half of the State's production is marketed outside its boundaries a comparison of Utah with the other coal producing states in the West is necessary.

Utah has held a relatively stable position in the total coal production picture in the West (Figure 25) until World War II when its position began to improve, principally because of the construction of the Geneva Steel Plant in Utah and the Fontana Steel Plant in California. It should be noted, however, that although the percentage position of the State has improved since early in World War II the actual production remained relatively stable, the increased production for the steel plants just about balancing losses of other markets. Utah's better proportionate position has come about therefore as a result of declining production in the other Western states. Total production in the West has declined from a peak of 33 million tons in 1944 to 19-1/2 million tons in 1952, the lowest output since 1935 and 1938. Utah is today the largest producer west of the Mississippi.

Daily production per man may be used as an indicator of the efficiency of the mines and the resource conditions of a mining area. The intense mechanization and the modern mining methods used, combined with very favorable resource conditions, have long kept the man-day production in the Utah mines well above the national average and usually above the average of the other Western coal producing states (Figure 26). The only Western states which consistently surpass the Utah figure are Montana and



Figur e 25, Coal production in Utah compared with other Western coal producing states, 1914-1952. (Sourc e: Minerals Yearbook, Various years).

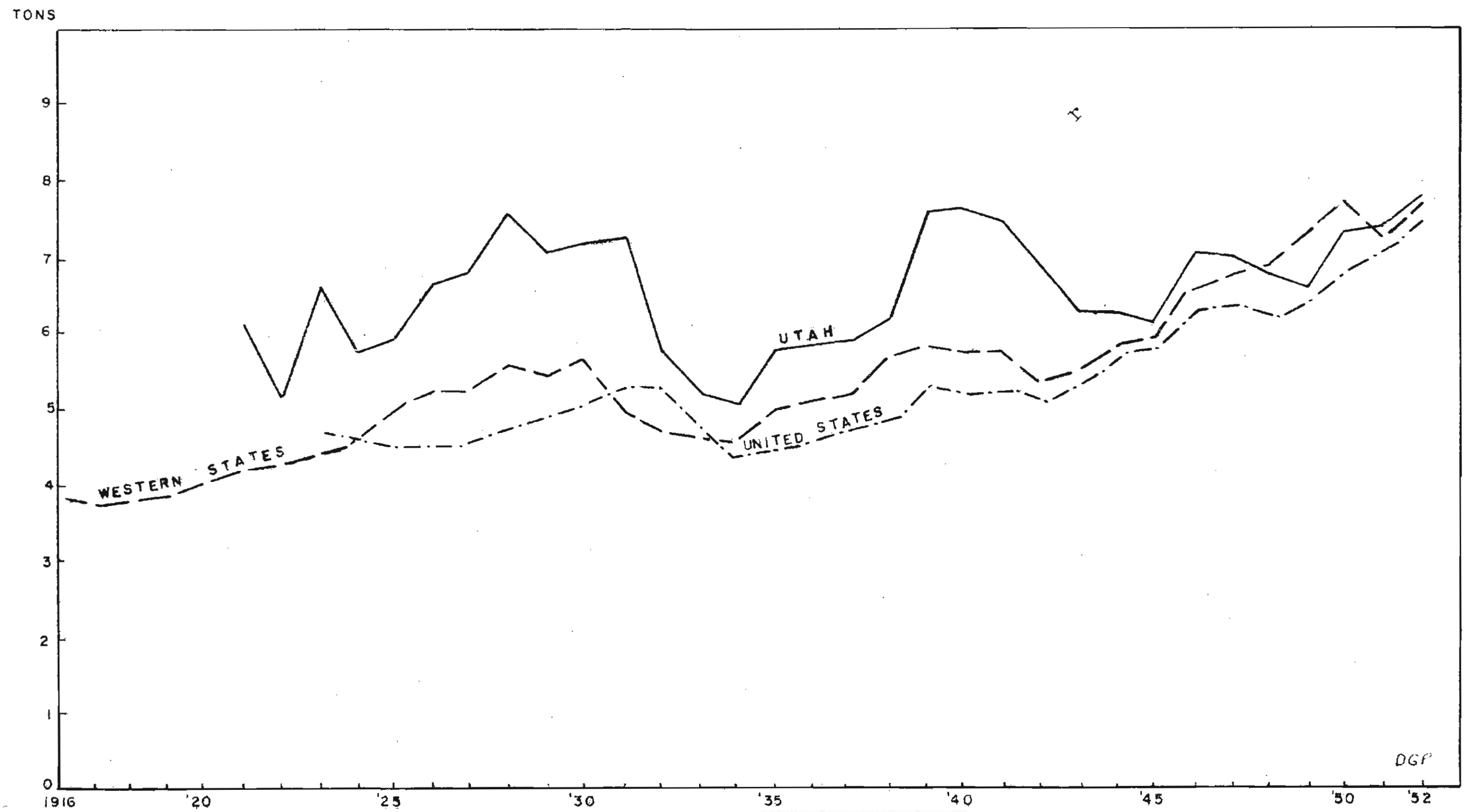


Figure 26, Average production per man/day in Utah, Western States, and the United States, 1916-1952. (Source: Minerals Yearbook, Various years).

Wyoming where strip mining raises their averages.

The Utah coal industry is in a favorable position to compete with any of the neighboring coal-producing states for the fuel markets of the West. The mines of the State are modern and well equipped, with good quality coal and favorable physical conditions for its exploitation. The commercial producers of the State are handicapped by the seasonal nature of coal demand, and competition from other fuels, but the increased use of coal in the iron and steel industry of the West has provided a more stable market for a large portion of the State's output. Efficient management is the key to the future success of the industry for operations must be planned to insure the maximum recovery of coal from the mines and to find markets to dispose of its products.

CHAPTER FIVE

MARKETING

When a mine has been opened and has become a producing concern the major emphasis shifts to the marketing of the coal. This is the greatest problem facing the industry today. The mechanization of the mining process and the large capacity of modern mines makes possible the production of any desired amount of coal. The main task now is to find and hold markets in the face of increasing competition for the coal that can be produced.

Marketing Channels

The coal industry uses three principal marketing channels:

1. Direct selling -- The producer's own sales department or organization sells the coal directly to the consumer. The larger Utah mining companies maintain salesmen in the Western states who personally contact all coal purchasers at frequent intervals. Some of the smaller mine owners in the State maintain coal yards in towns fairly close to their mines and deliver coal to the local consumers.

2. Sales Agencies -- The producer may appoint sales agents or marketing agencies who sell the coal on a commission basis. Sales agents are usually affiliated with the producing company. Marketing agencies may be controlled by the producers or may be independent of the mining industry. This method is extensively used by Utah producers who market coal in the

east and in many cities of the west, where trade does not warrant the expense of a salesman.

3. Distributors -- When the producer sells coal through this channel he sells it to the distributor at a discount who resells it to the ultimate consumer.

A single producer can and usually does utilize more than one of these channels. Thus, the coal may pass through the hands of two or more middlemen before it reaches the consumer. The producer's sales organizations, sales agencies, and wholesalers usually do not actually handle the coal; instead, they assemble the orders and pass them on to the producer for direct shipment to the distributor or consumer.

Transportation

Coal is a bulky, low value freight item that demands a reasonably low cost, efficient means of transportation if it is to compete with other fuels in distant markets. The railroads have always supplied this need in the West in the past, and despite the recent increased use of trucks, railroads still haul the great bulk of the coal shipped to market from the Utah fields (Figure 27).

The coal producing areas of Utah are served by four railroad companies, the Denver and Rio Grande Western Railroad, the Union Pacific Railroad, the Utah Railway, and the Carbon County Railroad (Plate VIII). The Denver and Rio Grande Western Railroad, Utah's leading coal carrier,

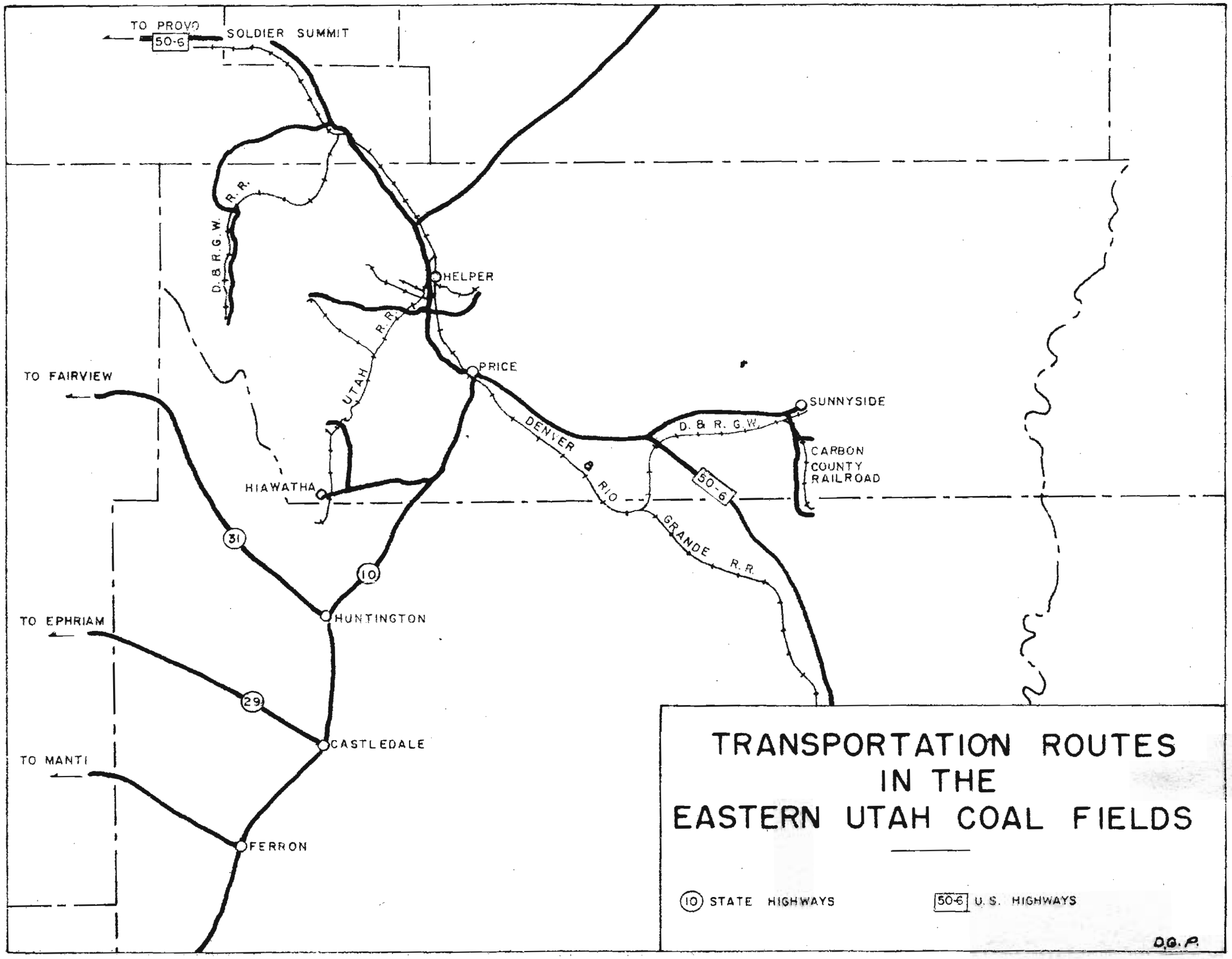

TO PROVO
50-6
SOLDIER SUMMIT
D.&R.G.W. R.R.
HELPER
UTAH R.R.
PRICE
TO FAIRVIEW
SUNNYSIDE
D. & R. G.W.
CARBON COUNTY RAILROAD
DENVER & RIO GRANDE R.R.
50-6
HIAWATHA
31
10
HUNTINGTON
TO EPHRIAM
29
CASTLEDALE
TO MANTI
FERRON
TRANSPORTATION ROUTES IN THE EASTERN UTAH COAL FIELDS
10 STATE HIGHWAYS
50-6 U.S. HIGHWAYS
D.G.P.

PLATE VIII

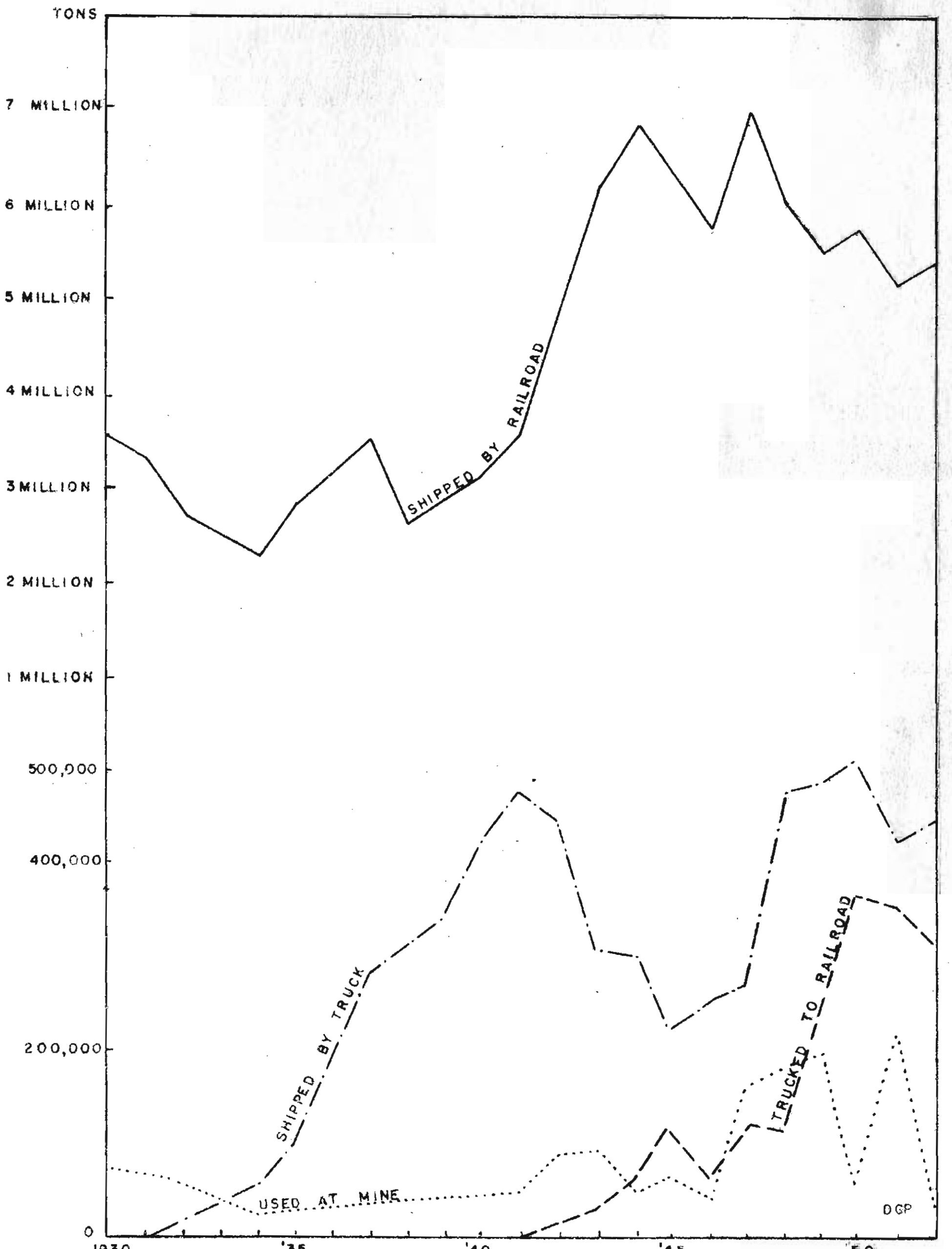


Figure 27, Disposition of coal produced in Utah, 1930-1952. (Source: Minerals Yearbook, Various years).

Figure 28. Coal train and the mainline of the Denver and Rio Grande Western Railroad in Spanish Fork Canyon.

Figure 29. Coal truck on U. S. Highway 50-6 in Price River Canyon.

traverses Carbon County from west to east after leaving Price River Canyon at Helper. The mainline serves the mines at Royal and Castlegate and branch lines serve some of the other mining districts. In western Carbon County branch lines extend from the mainline to the Spring Canyon district, to Kenilworth and to Clear Creek in Pleasant Valley. In the eastern portion of the county a branch line has been built to Sunnyside and in Grand County a line extends from Tompson to the mines at Sego. The lines of the other two railroads operating in the Carbon-Emery coal fields join with the Denver and Rio Grande Western and the coal loaded on these lines is transported over the Wasatch Plateau on the Denver and Rio Grande Western mainline. The Utah Railway has joint trackage rights from its junction with the Denver and Rio Grande Western to Provo, while the Carbon County Railroad simply transfers its cars to the Denver and Rio Grande Western in the same manner in which freight is usually exchanged between railroads.

The Utah Railway serves the mines in western Carbon and Emery Counties from Mohrland and Hiawatha north to Spring Canyon. In the Spring Canyon district its line parallels that of the Denver and Rio Grande Western Railroad. The Utah Railway has a junction with the Denver and Rio Grande Western Railroad near Helper, and maintains its shops and terminus in Provo. Its rolling stock is jointly owned with the Union Pacific Railroad.[1]

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[1] Anderson, G. S., "Hauling Coal to Market," Mining and Metallurgy, 29:572, Oct. 1948.

The Carbon County Railroad is the smallest of the four operating companies in size but since all of the coal shipped to the Geneva Steel Plant originates on its line, it is second only to the Denver and Rio Grande Western in the amount of coal shipped (Figure 30). This line extends south along the Book Cliffs, from its junction with the Denver and Rio Grande Western near Dragerton, to the Horse Canyon mine. It is owned by the United States Steel Corporation and serves the company's two mines at Columbia and Horse Canyon and the small mine of the Book Cliffs Coal Company one mile south of Horse Canyon.

The Coalville field is served by the Union Pacific Railroad. The Park City branch passes through Coalville and some of the coal mined nearby is trucked to the railroad and loaded for shipment, however, the amount hauled on this line has been small for a number of years and none has been reported since 1949.[1] None of the other minor fields are served directly by any railroad, although the Marysvale branch of the Denver and Rio Grande Western passes through Salina where some of the coal from the Salina Canyon district is trucked to the railroad.

The changing volume hauled by the different lines reflects the general economic picture of the coal industry. The relative positions of the different lines has remained almost the same throughout the years, except for the Carbon County Railroad whose annual loadings increased sharply with the opening of the Horse Canyon mine in 1943.

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[1] Minerals Yearbook, U.S. Bureau of Mines, 1950.

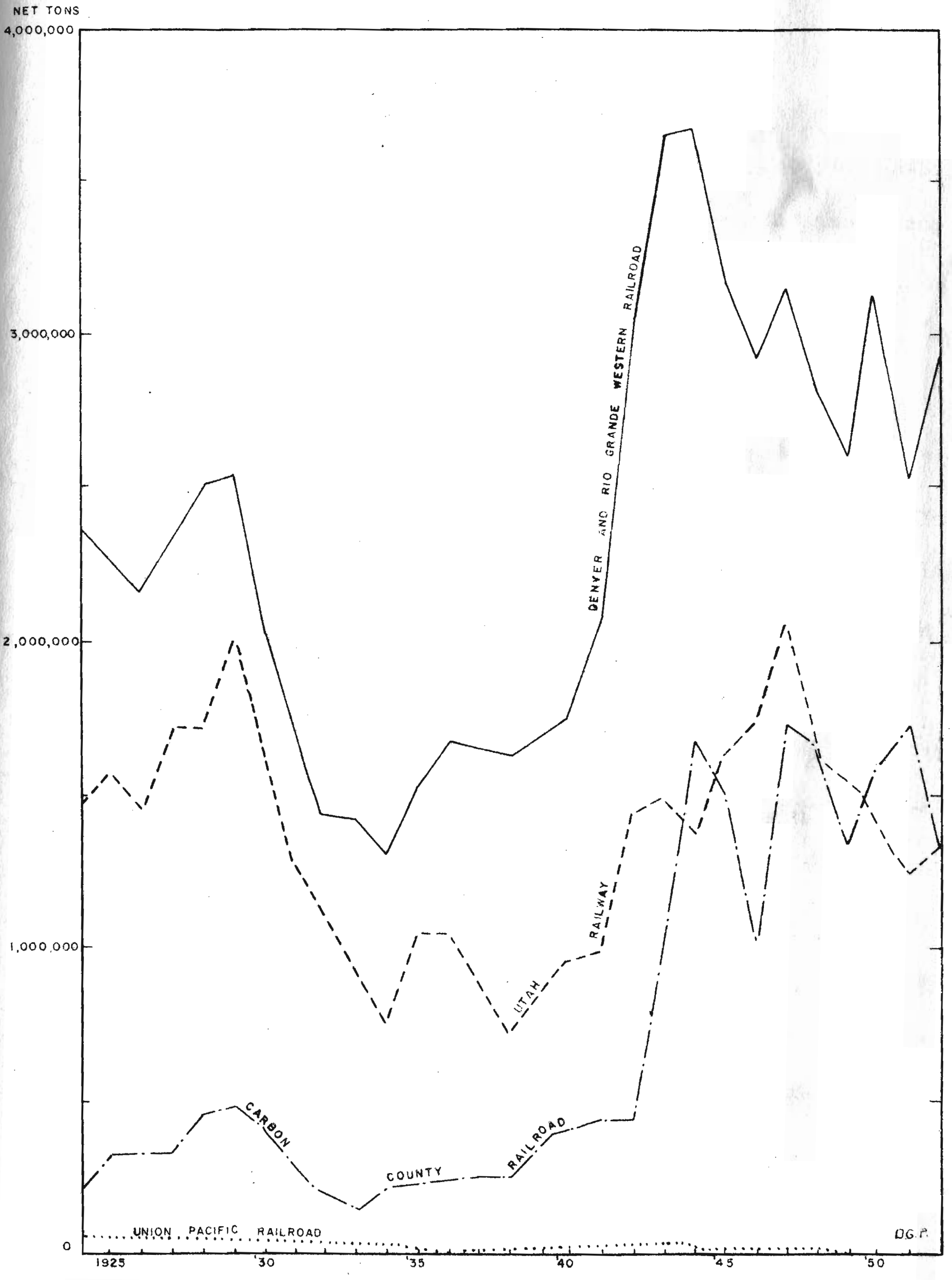

Figure 30, Coal loaded for shipment on railroads, 1924-1952.
(Source: Minerals Yearbook, Various years).

Trucks came into widespread use in the 1930's when the building of adequate roads and better vehicles made this type of transportation able to compete favorably with the railroads, especially for short runs of 100 to 200 miles (Figure 27). Trucking of coal is a highly individualistic business with the trucker usually owning and operating his own truck. Many farmers in north and central Utah use their farm trucks to haul coal in the winter season. Most of the coal hauled by truck is purchased by the trucker at one of the smaller mines and sold to the individual consumers; few of the large mines sell much truck coal. Some of the small mine owners truck the coal to coal yards in neighboring towns where it is then distributed.

The latest method adopted for transporting the coal to market is a combination of truck and railroad (Figure 27). The mines operator establishes a loading dock at the railroad and the coal is trucked to the railroad from the mine. This practice is most prevalent in the Book Cliffs field north of Price, where the coal is hauled to the railroad at Price or Wellington, and in the Huntington Canyon district of the Wasatch Plateau field, where the coal is hauled to the terminus of the Utah Railroad at Mohrland or to Price.

Market Areas

The market for coal is usually in an area within a reasonable distance surrounding the mining centers unless there is some special property of the coal which creates a demand for it a long distance from the mines. The low unit value of coal, and its bulkiness combine to make freight rates the most important single factor in determining market areas for coal. Since freight rates constitute one-third or more of the delivered price of coal in northern Utah the importance of this charge in the marketing of coal is apparent (Table 5).

Table 5

COST OF COAL AT MINES AND FREIGHT RATES TO SELECTED UTAH CITIES, 1954

	Av. Cost of Coal at Mines[1]		Freight[2] Rate on Slack Coal		Total Cost at Destination
Destination	Dollars	% of Total	Dollars	% of Total	
Salt Lake City	5.34	66.2	2.73	33.8	8.07
Park City	5.34	61.3	3.37	38.7	8.71
Logan	5.34	64.1	2.99	35.9	8.33
Garfield	5.34	66.2	2.73	33.8	8.07
Delta	5.34	60.6	3.48	39.4	8.82

Source: [1] Minerals Yearbook
[2] Denver and Rio Grande Western Railroad

Although this is an important portion of the cost of coal to the Utah consumer, it becomes even more important in distant markets where the freight rates may constitute sixty per cent of the delivered price (Table 6).

Table 6

FREIGHT RATES FOR COAL FROM UTAH AND SOUTHERN WYOMING COAL FIELDS TO SELECTED CITIES, 1954[a]

Destination	Rate from E. Utah[b]		Rate from S. Wyoming[c]	
	Other than Slack	Slack	Other than Slack	Slack
Idaho Falls, Ida.	$4.50	$4.23	$4.18	$3.91
Twin Falls, Ida.	5.10	4.45	4.77	4.13
Boise, Ida.	5.95	5.25	5.65	4.94
Butte, Mont.	5.50	5.16	5.20	4.84
Great Falls, Mont.	7.30	7.30	7.00	7.00
Pasco, Wash.	6.45	6.20	6.15	5.90
Spokane, Wash.	6.45	6.20	6.15	5.90
Eugene, Ore.	8.25	8.25	7.95	7.95
Portland, Ore.	6.65	6.20	6.35	5.90
Seattle, Wash.	6.85	6.40	6.55	6.10
Reno, Nev.	7.20	6.70	7.20	6.70
S. Francisco, Cal.	7.55	6.70	7.55	6.70
Las Vegas, Nev.	5.80	6.55	--	--
Los Angeles, Cal.	7.55	6.70	8.05	7.20

a. Does not include three per cent federal transportation tax.

b. Includes all Carbon, Emery, and Grand County rail-served mines.

c. Includes Rock Springs, Green River, Wyoming and Coalville, Utah.

Source: Denver and Rio Grande Western Railroad and Union Pacific Railroad.

The problem of freight rates has been very important since the end of World War II, for during this period of greatest market competition the Interstate Commerce Commission has granted eleven rate increases in coal, constituting a sixty per cent advance in rates for that period.[1]

The principal market areas for Utah coal are intrastate -- California and the Pacific Northwest (Plate IX). Small amounts of coal are shipped into the Middle West. The Utah market is concentrated along the Wasatch Front in northern and central part of the State. In 1952 intrastate consumption amounted to over one-half of the State's production. The largest consumer in the State is the Geneva Steel Plant which has become a stabilizing influence in the coal industry since World War II. The coal transported by truck from the mining centers is marketed almost entirely in the urban centers of northern and central Utah.

In the out-of-state markets, Idaho, Oregon, Washington, and Montana have long been the largest and most dependable outlet (Table 7). Sales of Utah coal in this area in 1952 amounted to 24 per cent of the State's production and this has been the approximate level of consumption in the Northwest for many years. California in 1952 consumed sixteen per cent of the Utah production, the great bulk being used in the Kaiser Corporation's steel mill at Fontana. The California commercial market has been steadily

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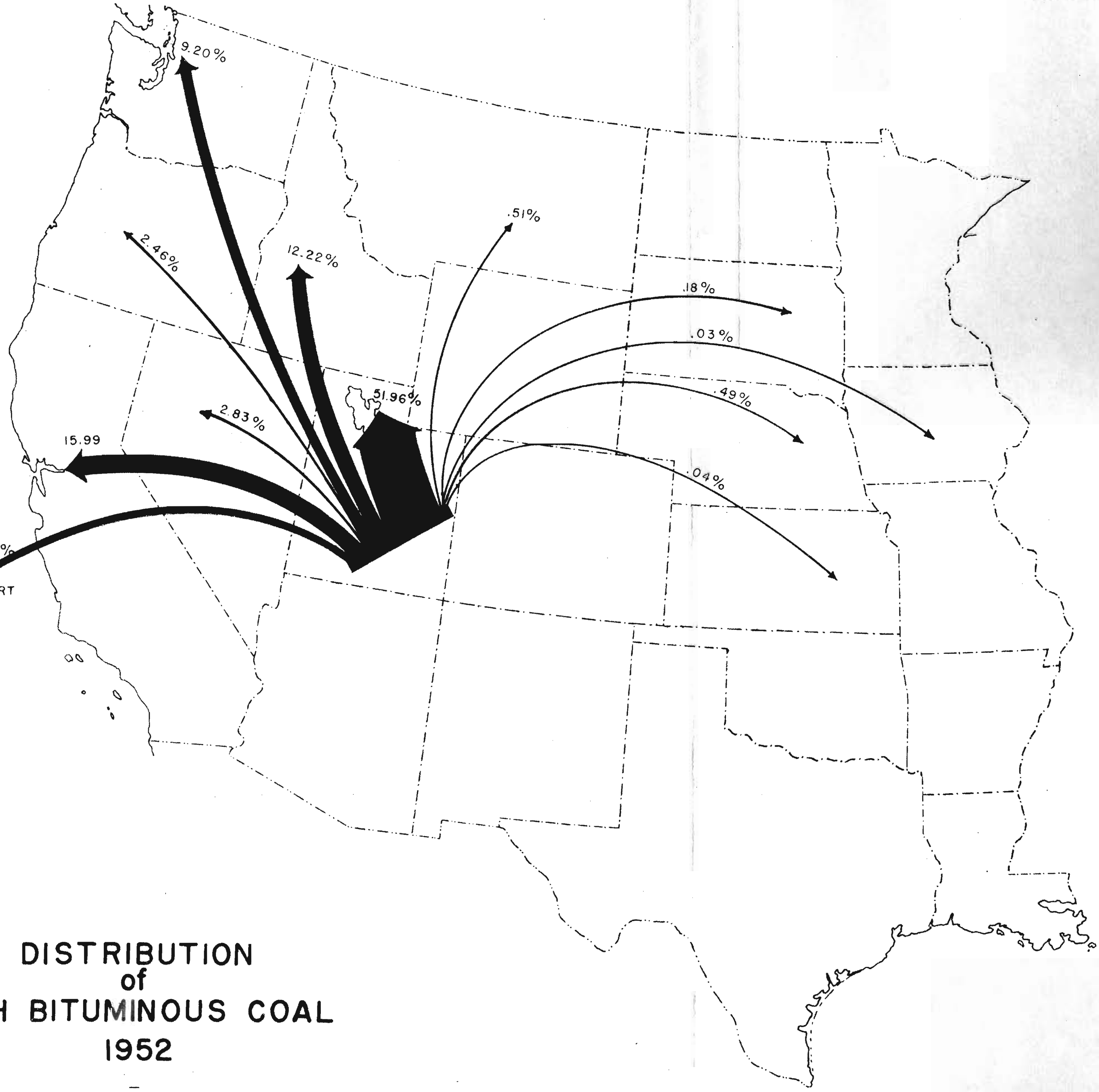
[1]Bituminous Coal Institute, Bituminous Coal Annual, 1952, (Washington D.C.: Bituminous Coal Institute, 1952), p. 12.



DISTRIBUTION of UTAH BITUMINOUS COAL 1952

SOURCE: U.S. BUREAU OF MINES & UTAH COAL OPER. ASSOC.

DONALD G. PRINCE 4/54

Table 7

COMMERCIAL COAL SHIPPED FROM UTAH MINES, NET TONS[a]

States	1941	1944	1948	1952
California[b]	100,894	161,863	62,254	32,326
Colorado	1,151	77	727	--
Idaho	601,577	787,641	743,745	730,175
Iowa	210	--	5,256	1,853
S. Dakota	1,120	2,443	22,439	11,003
Kansas	9,407	2,319	5,675	2,315
Montana	23,177	27,258	32,418	31,776
Nebraska	11,050	6,136	33,875	30,263
Nevada	218,967	246,766	191,306	173,894
Oregon	106,180	260,412	220,656	150,643
Washington	153,387	627,684	754,790	565,272
Export Coal	--	--	38,823	245,945
Totals	1,227,120	2,122,599	2,111,955	1,975,465

aDoes not include shipments from mines not members of the Utah Coal operators Association.

bDoes not include coal shipped from captive mines to steel plants in California.

Source: Utah Coal Operators Association

declining with the increased use of oil and natural gas. Nevada has consumed about two to three per cent steadily through the years. More favorable location has given the Wyoming, Colorado and eastern producers almost complete control of the Middle West market. Utah coal shipments into this area are usually in response to special orders from dealers who, for some special reason, prefer this particular coal.

The export market has been important only in the years following World War II and during the Korean emergency. The demand for Utah coal on the export market came during 1948-1952 when eastern coal, being fully utilized by defense industries in this country, could not satisfy requirements for foreign export to Japan, Okinawa, and other Asiatic areas. However, when mobilization requirements for eastern coal diminished in 1953, Utah coal was bid out of this foreign market. A ton of eastern coal can be shipped by sea, through the Panama Canal to the California ports for $1 while it costs on an average of about $7 to ship a ton of Utah coal to the same destination by rail.[1]

Competition for Markets

Competition is the byword of the coal industry. Competition between different producing areas, competition between producers in the same field and competition between coal and other types of fuel have long plagued the industry.

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[1] Carbon-Emery Labor Market Report, The Industrial Commission of Utah, Dept. of Employment Security, March 15, 1954, p. 5.

The Pacific Northwest is the principal area of competition between Utah coal and coal from other producing areas of the West. This area is the natural market for coal mined in Utah, Wyoming, Washington and Western Canada. The Utah producer is handicapped to some extent by higher freight rates to this area as compared with those charged Wyoming producers, as the latter can ship to points in the Northwest at an average of 30 to 40 cents per ton below the Utah rate (Table 6). The proximity of the Washington and Canadian coal fields to the Northwest market areas insures these producers a lower freight cost for their product. Despite this apparent disadvantage Utah continues to sell a considerable share of its production in this area. Utah coal has three qualities that make it desirable as a heating fuel and enable it to be sold on the Pacific Northwest market at a higher cost than its competitors: (1) it has a higher heating value; (2) Utah coal has better storage characteristics than other Western coals, as it can be stored for several months and not weather and crumble as do those of lower rank; (3) it has a low fusion point and it forms clinkers in the firebox making the cleaning of the furnace a fairly simple operation.

Wyoming coal is of lower rank, sometimes bordering on sub-bituminous, and has a high fusion point which gives an ash instead of clinkers when burned in a furnace. The coal mined in Washington in the past was good bituminous quality, however these high-grade deposits have now been exhausted and the coal mined today is sub-bituminous in rank.[1]

[1]Woodhead, Vern, Independent Coal and Coke Co., Salt Lake City, Utah, Personal Interview.

Because of the lower grade of Washington coal it can compete only in special circumstances where it is protected from outside competition or when unusual demand creates a market demand which cannot be satisfied by imported coal. Washington state law requires the use of Washington coal in state institutions, thus excluding imported fuels from this particular market.

Imported coal is a source of considerable competition to Utah coal in the Pacific Northwest. The largest amounts are shipped into Montana and Idaho from the Canadian fields just north of the international border in southeastern British Columbia (Table 8). The Canadian fields have direct railroad connections into the Northwest market areas and since there is no tariff on coal they can easily compete for this market. The Canadian coal is used largely for industrial purposes as it is a coking coal. It is not satisfactory for use in stoker-fed heating plants because when burned it forms a block of coke at the mouth of the stoker and prevents the stoker from functioning properly. Coal imports into California have been small in the past, but with cheap water transportation available it is possible for eastern producers to compete in this market if a demand for coal ever develops in California.

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Table 8

COAL IMPORTS INTO WESTERN UNITED STATES, 1949-1952
Net Tons

Customs District	1949	1950	1951	1952
Los Angeles	--	53	441	--
Montana & Idaho	143,926	164,973	157,500	129,876
Washington	12,068	15,264	1,594	1,127

Source: Minerals Yearbook, 1952

In the past few years when the coal market has been diminishing steadily the problem of extreme competition between producers in the same producing area has arisen. It has become the most noticeable in the selling of coal by contract, usually to government agencies. In their desire to obtain the contract the producers continue to underbid each other until the final price is so low that there is no possibility of the company who gets the order to make any profit. Many producers feel that there should be some agreement between themselves to avoid this underbidding, but it is doubtful if this can be accomplished.

Edward Devine has illustrated the problem of competition with other fuels very well with the statement, "The value of the coal in economic theory is determined by its marginal utility to the consumer; by the point at which he will diminish his consumption or seek substitutes."[1] The problem facing the coal industry is one of keeping prices low enough to hold the consumer in the face of higher production and transportation costs.

[1] Devine, Edward T., Coal (Bloomington, Ill.: American Review Service Press, 1935), p. 29.

The struggle for markets between coal and other fuels, mainly fuel oil and natural gas, has long been a major problem to the coal industry. For many years before the discovery of the oil and gas fields of the West, coal was practically the only major source of domestic heat. The beginning of oil and gas production on the Pacific Coast soon led to the displacement of coal as a fuel in that area and with the introduction of natural gas into Utah in 1929 the switch from coal to gas for heating began on the local market. By 1952 there were 93,873[1] outlets for natural gas in the State and commercial consumption of coal had dropped from 1,840,000 tons in 1942 to 1,295,000 tons in 1952[2]. The introduction of Clear Creek natural gas in 1952 was large enough to replace 700,000 tons of coal on the Utah market.

Although this change from coal to oil or natural gas by the consuming public is usually thought of as matter of economics the human elements cannot be ignored. The ease with which gas or oil can be used when compared with coal may be the most important factor in the loss of coal markets. Gas or oil heating equipment are generally smaller than coal units, the fuel storage space required is negligible, and both are cleaner than coal which must be handled by the consumer. The comparative prices of coal, natural gas and fuel oil per heat unit (Table 9 and 10) show that coal

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[1] "Annual Report, Mountain Fuel Supply Company" 1952, p. 18.

[2] Figures compiled by the Utah Coal Operators Association.

Table 9

EQUIVALENT PRICES OF COMMERCIAL STANDARD GRADES OF FUEL OIL PER TON OF UTAH COAL

Cost of Fuel Oil Cents per Gal.	No. 1 Fuel Oil 184 gals. per ton Utah coal	No. 2 Fuel Oil 180 gals. per ton Utah coal	No. 3 Fuel Oil 177 gals. per ton Utah coal
2	$ 3.68	$ 3.60	$ 3.54
3	5.52	5.40	5.31
4	7.36	7.20	7.08
5	9.20	9.00	8.85
6	11.04	10.80	10.62
7	12.88	12.60	12.39
8	14.72	14.40	14.16
9	16.56	16.20	15.93
10	18.40	18.00	17.70
11	20.24	19.80	19.47
12	22.08	21.60	21.24
13	23.92	23.40	23.01
14	25.76	25.20	24.78
15	27.60	27.00	26.55
16	29.44	28.80	28.32
17	31.28	30.60	30.09
18	33.12	32.40	31.86
19	34.96	34.20	33.63
20	36.80	36.00	35.40

Example: Cost of fuel oil per cents per gallon is 15 cents. Following figures to right from cost of fuel oil 15 cents per gallon. No. 1 fuel oil is equal in cost to coal at $27.60 per ton, No. 2 at $27.00 and No. 3 at $26.00.

Cost of Fuel Oil and Coal in Selected Utah Communites, Per Gal.:

	No. 1 Fuel Oil	No. 2 Fuel Oil	No. 3 Fuel Oil	Stoke Coa
Salt Lake City	14.5¢	12.0¢	11.5¢	$11.9
Provo	15.5	14.5	12.25	11.3
Ogden				

Source: Utah Coal Operators Association

Table 10

COMPARATIVE COST FOR DOMESTIC HEATING ONLY: UTAH STOKER COAL AND NATURAL GAS, SALT LAKE CITY AND IMMEDIATE VICINITY

Average inside temperature during heating season 70° F.
Stoker coal 12,500 B.t.u.'s per lb. - Natural Gas 875 B.t.u.'s per cu. ft.

$$\frac{25,000,000 \text{ B.t.u's per ton Utah Stoker coal}}{875,000 \text{ B.t.u.'s per Mcf natural gas}} = 28.6 \text{ Mcf. natural gas equivalent heating value per ton Utah stoker coal.}$$

(1) (a) Design heat loss B.t.u.'s per hour	(2) Tons Stoker coal required per heating season	(3) (b) Cost STOKER COAL per heating season	(4) Mcf. Natural gas per heating season	(5) (c) Cost natural gas for heating only	(6) (d) If natural gas is used for cooking, refrigeration, water heating, and heating, the cost for heating only is reduced to:
30,000	4.05	$ 45.72	115	$ 59.78	$ 44.08
40,000	5.40	60.96	154	74.69	58.52
50,000	6.75	76.20	(d) 193	* 89.54	73.74
60,000	8.10	91.45	231	103.99	87.75
70,000	9.45	106.69	270	117.69	102.28
80,000	10.80	121.93	309	133.21	116.76

(a) Average 4 to 5 room houses 45,000 to 60,000 B.t.u.'s heat loss.
Average 6 to 7 room houses 65,000 to 75,000 B.t.u.'s heat loss.

(b) Domestic oil treated stoker coal @ $11.29 per ton delivered to user's bin: Includes 4¢ per ton Federal transportation tax.

(c) Based upon Mountain Fuel Supply Company General Service Rate GS 1 that became effective July 1, 1951, and is in effect at the date of this fuel study.

(d)

	Mcf.	Cost
Average annual consumption and cost of natural gas for cooking, water heating and refrigeration is -	63.6	$45.72
Cost for heating when above services are used -	193.0	73.74
Total annual consumption and cost natural gas	256.6	$119.46

Note: As shown in Column 5 above, when gas is used for heating alone, annual cost for 193 MCF is $89.54.
Source: Utah Coal Operators Association

is the cheapest fuel for domestic heating. It may be concluded therefore that convenience in handling and burning are the main factors in the increasing switch from coal to natural gas or fuel oil for domestic heating.

The industrial market for coal has been invaded to a certain extent by natural gas but not nearly to the extent of the domestic market. The chief industrial user of coal is still the iron and steel industry and as yet no suitable substitute has been found for coal in their operation. In the years since World War II the Geneva Steel Plant and the Kaiser Corporation Steel Plant at Fontana, California annually consumed about 37 per cent of the Utah output.

In electric power generation the use of coal fell off considerably with the development of gas and oil on the Pacific Coast.[1] Today only a small fraction of the power generated in steam electric plants is produced by burning coal (Table 11). Utah, Colorado and Wyoming are the only States in the West where any considerable amount of power is generated in coal-burning plants,[2] but with the increased demand for electric power, the increasing prices of gas and oil and the ultimate limit of expansion of hydroelectric installations the use of coal in steam plants in the West should increase as it has in the East.

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[1] "Available Coal for Western Steam Plants," Electrical West, 103:67, Oct. 1949.

[2] Steam-Electric Plant Fuel Consumption and Costs, 1952, (Washington, D.C.: National Coal Association, Bureau of Coal Economics, Aug. 1953), p. 22

Table 11

ELECTRIC UTILITY GENERATION BY TYPE OF FUEL AND POWER, KILOWATT-HOURS IN MILLIONS, PER CENT OF TOTAL

State and Source of Power	1938	1940-44 Average	1945-49 Average	1950
Montana				
Bituminous	--	--	--	--
Oil	0.1	--	0.1	0.1
Gas	1.6	1.5	1.1	0.8
Hydro	98.2	98.4	98.8	99.1
Total KwH	1,324	2,250	2,667	3,136
Idaho				
Oil	0.1	0.1	0.2	0.1
Hydro	99.9	99.9	99.8	99.9
Total KwH	992	1,226	1,513	2,538
Utah				
Bituminous	3.8	44.0	28.7	25.6
Oil	1.4	1.9	4.5	5.5
Gas	--	0.2	0.2	0.3
Hydro	94.8	53.9	66.6	68.6
Total KwH	340	562	530	659
Oregon				
Oil	8.4	0.9	1.2	0.3
Gas	a	a	a	a
Hydro	79.9	91.1	95.3	95.9
Total KwH	1, 254	3,543	4,904	5,545
Washington				
Bituminous	a	a	0.1	a
Oil	1.2	1.7	1.3	0.4
Hydro	95.3	95.5	98.0	99.3
Total KwH	3,401	6,840	11,783	17,371
California				
Bituminous	a	0.1	a	a
Oil	1.3	7.9	22.2	16.6
Gas	5.1	11.4	14.4	23.5
Hydro	93.5	80.4	63.6	59.6
Total KwH	9,427	12,500	19,018	24,836
Nevada				
Bituminous	0.7	0.5	a	a
Oil	0.1	0.1	0.2	0.3
Gas	--	--	a	a
Hydro	99.2	99.4	99.8	99.7
Total KwH	1,491	2,735	3,037	3,210

[a]Less than 0.05 per cent.

Table 11 (Continued)

In cases where the total percentages do not equal 100 per cent some other type of fuel, such as wood waste is used in the generating plants.

Source: Bituminous Coal Annual, 1952.

One of the greatest losses of markets by coal to another fuel has been in the railroad industry where the increased use of diesel engines has made steady inroads into coal consumption. In 1952 the use of coal by the nation's railroads was only 33 per cent of the 1942 consumption and has been steadily declining since the end of World War II.[1] The railroads operating in Utah today are almost completely dieselized and in a few years the conversion will be complete. As a result the purchase of Utah coal by the railroads has decreased by 90 per cent in the past decade and may soon cease entirely unless some new method for powering locomotives with coal is developed (Table 12).

Table 12

BITUMINOUS COAL SOLD TO RAILROADS IN UTAH 1941-1952

Year	Tons
1941	861,992
1942	1,098,973
1943	1,158,149
1944	938,551
1945	782,332
1946	610,026
1947	525,261
1948	414,542
1949	363,204
1950	217,050
1951	182,093
1952	137,739

Source: Utah Coal Operators Association

[1]Pope, Loren, Powering America's Progress, (Washington, D.C.: Coal Institute, 1951), p. 30.

The competitive position of the Utah coal industry is becoming more difficult with the passing of time. Production and transportation costs continue to increase while at the same time market areas are being lost. In competition with coal mined in the other Western States and Canada, Utah coal is favored by most consumers because of its better heating and storage properties. However, the loss of markets to other fuels since World War II has forced the closing of many mines and brought hardship to the industry and the miners.

CHAPTER SIX

THE MINER AND THE UNION

Although the bituminous coal miner is an almost unknown person to most of the people of this country the results of his labor are one of the very foundations of our industrial society. Common impressions are based upon newspaper stories and pictures of dirty-faced men as they leave the mines for a strike, or the tense, sad faces of men, women, and children as they are photographed huddled around the mine, or men at work as they are photographed huddled around the mine, or men at work on rescue crews when some spectacular disaster has focused national attention on the industry. The localized nature of the mining industry in areas distant from the main centers of population gives most people little opportunity to come in contact with the coal miner.

The isolation of the mining settlements, the extreme danger of the work, and the frequent clashes with the operators and public opinion has influenced both the character of the men who mine the coal and organization to which they belong. McAlister Coleman portrays this when he writes:

> "Mining is no dull routine and it produces a human being who is tough, durable, and proud and who lives in the isolated communities of the coal fields. Out of his pride and isolation, the miner develops an inferiority complex. He feels that no one cares very much about him and that coal is something which everyone takes for granted. The sense of inferiority acts as a cohesive which binds each and every miner to his group in a way that most Americans have difficulty in understanding. When miners strike, they strike as a body. They obey John L. Lewis without question, for

> John L. Lewis is the union and the strike weapon is the only weapon they understand. They believe only in the strength of United action on the industrial front. "No contract, No work," is their slogan.[1]

The miner has not always been in a position to turn to the union for protection and help in a dispute with the operator. Before the coming of the union to the Utah coal fields in 1933 almost no voice was given to the miner concerning his working and living conditions. He worked for wages set by the company and these were always subject to arbitrary change. Working conditions and mine safety procedures were often under the control of men who were more interested in making a profit than the welfare of the miners. He lived in company-owned houses and spent his money at the company store; some mines even paid in script, good only at the company store. Hint of union activity or sympathy was enough to bring swift discharge and eviction from his home.

The miner's union had been active in the coal fields of the Appalachians and the Midwest for many years before any attempt was made to organize the Utah fields. Two early attempts to organize the Utah miners, in 1903 and 1919, were met with swift action by the companies and all union members were soon discharged and the union was unable to establish any organization.[2] The unionization of the Utah mines occurred shortly

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[1]Coleman, McAlister, Men and Coal, (New York: Farrar & Rinehart, Inc., 1943) p. XV.

[2]Memmett, Frank C., "Development of the Union and Coal Production in Carbon County, Utah," Unpublished Masters Thesis, Dept. of Economics, Brigham Young University, 1950, p. 59-63.

after the passage of the National Industrial Recovery Act of 1933, whose famous Section 7 (a) gave labor the right to organize and bargain collectively. To the United Mine Workers of America Section 7(a) meant just one thing - the chance to organize the nonunion coal fields with legal sanction.[1]

The spring of 1933 the miners union launched the largest organizing campaign in its history:

> "Assembling the largest force of organizers the United Mine Workers had ever put into the field, some hundred professionals and volunteers, he (John L. Lewis) set aside for their use the last cent of the International treasury and bade them go forth and say to all nonunion men: 'The President wants you to join the union.'
>
> "Here of course, was the brashest of assumptions, warranted by nothing in the NIRA nor by any statement from the White House. But it was a compelling summons and it worked * * *.
>
> "Through territory where, not long before, federal troops and government men had deployed against the marching unionists, * * * drove the organizers calling out: 'The President wants you to join. Your government says join the United Mine Workers.'
>
> "The instantaneous, mass response to the organizers' appeals on the part of men who had never seen the inside of a union hall stunned the nonunion operators and must have come as a surprise to Lewis himself. And so it was. Organizers shouted their summonses under the noses of the coal and iron police. The sullen riders did not dare attack men who seemingly had behind them the support of the federal government. Nonunion operators were loath to order the terrorization of such numbers of their workers who were obviously eager to join the once-outlawed organization."[2]

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[1] Coleman, _op. cit._, p. 148.

[2] _Loc. cit._

Union organizers soon had the majority of the Utah coal miners in the ranks of the miner's union. Thus the United Mine Workers of America emerged as an important factor in the Utah coal industry. The power of this group has grown enormously and often has been used, in the form of long and costly strikes, to so affect the economy of the whole nation that the operators have been forced to accede to union demands or have their properties seized by the federal government.

Many operators took the Supreme Court decision declaring the NIRA unconstitutional to be a death blow to unionism in the mines. But the union was now strong enough to exert some pressure, conditions remained relatively unchanged and the Guffy Act, passed in August 1935, continued the provisions of NIRA as they applied to the bituminous-coal industry.[1]

The United Mine Workers of America is a strong, militant organization with headquarters in Washington, D.C. exercising supreme power over the actions of every local subdivision. The Utah and Wyoming mines are included in District 22. The district is presided over by officers elected by the members under its jurisdiction. These officers are the only full time, paid employees of the union. Each mine has its own local organization which is responsible for the effective control of its members and the execution of union policies. There are local organizations in 28 mines

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[1] Ibid., p. 156.

in the Utah coal fields with a total membership of 3,785 in 1952. This is not the majority of the mines, but it does include the majority of the mine workers; 93 per cent of the mine workers were union members in 1952.[1] These organizations are in all the larger mines, while most of the small truck mines are nonunion. Attempts have been made to organize these mines but none have succeeded.[2] The Utah miners have joined in every nationwide strike called by the national headquarters since 1933 and in addition have called many walkouts of their own, sometimes in apparent violation of the wishes of the national officers (Appendix A).

The contracts between the United Mine Workers of America and the coal operators are almost identical for all sections of the country. The agreements are worked out in Washington D.C. by the mine workers and representatives of the large eastern producers. The Utah operators have no voice in the negotiations and must accept the contract or face a prolonged strike and loss of their markets to other coal areas.[3] The present contracts involve the union directly in almost every phase of the mining industry. Wages, hours, working conditions, medical care, vacations, retirement, and housing are some of the facets of the miner's life that are either directly

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[1]Reeder, R.D., Chief, Salt Lake City Office, Accident Prevention and Health Division, U.S. Bureau of Mines, Personal Interview.

[2]Sacco, Frank J., Secretary-Treasurer, District 22, United Mine Workers of America, Personal Interview.

[3]O'Conner, William J., Pres., Independent Coal and Coke Co., Personal Interview.

controlled, or at least affected, by union-management negotiations.

Union membership is a prerequisite for continued employment in the coal industry. The miners' union has a virtual closed shop in coal mining since the operators will not continue to employ any man who does not join the union within a specified time. After a man is hired and becomes a member of the miners' union he cannot be discharged except for violation of the terms of the contract. In periods of reduced operations any dismissal of miners is done on a strict seniority basis prescribed in the contract. To insure the continued financial support the contract always included a clause providing for deduction of dues from the pay of the miner.

Wages are probably the greatest cause of labor disputes in any industry. The fight to raise the wages of the coal miner has been continuous even before the advent of the union, but it has only been since the unionization of the mines that the miner has had the power necessary to force the operators to give the desired increases. During the depression, wage rates in the industry fell considerably from those in previous years. For a few years after the organization of the mines not even the union could obtain an increase in wages if the operator was not able to sell his coal. With the advent of World War II and the greatly increased demand for coal, the union became more aggressive and in a series of moves, involving some strikes in wartime that were severely criticized, the mine owners were forced to grant increases. Since 1941 the wages of the coal miners have nearly tripled along with the addition of many other benefits that could be classified as wages (Table 13).

Table 13

AVERAGE DAILY RATE OF PAY IN THE BITUMINOUS COAL INDUSTRY[1]

Year	Underground Work	Outside Work
1922-1928	$ 8.15	--
1929-1930	6.93	--
1941-1943	7.65	6.95
1945	10.65	9.95
1950	20.10	18.60

[1] Based on 8-hour day, 5-day week. Time and one-half for sixth consecutive day and double time for seventh consecutive day.

Source: National Bituminous Coal Wage Agreements, 1941, 1945, 1950
Memmott, F. C., "Development of the Union and Coal Production in Carbon County, Utah, p. 59.

The wages paid coal miners are often looked upon as being relatively high for industrial labor especially when compared with those in other industries (Table 14). Daily wage rates are high because of two reasons: (1) coal mining is a hazardous occupation, beset with many dangers not found in ordinary occupations; (2) coal mines operate for only about 200 days per year, depending upon market conditions, and under such irregular conditions some special inducements must be offered the worker. He is more or less tied down to his job inasmuch as he must always be ready to go back to work on short notice or lose his job to someone else. It is also very difficult for a coal miner living in the isolated mining towns to find

Table 14

AVERAGE ANNUAL WAGES FOR SELECTED UTAH INDUSTRIES, 1952

Industry	Average Annual Wage
Crude Petroleum and Natural Gas	$ 4,884
Products of Petroleum and Coal	4,824
Metal Mining	4,802
Bituminous Coal Mining	4,704
General Construction	4,560
Primary Metal Industries	4,508
Fabricated Metal Products	4,154
Non-Metal Mining and Quarrying	4,080
Stone, Clay and Glass Products	3,768
Building Construction	3,552
Trans., Communication and Utilities	3,456
Finance, Insurance and Real Estate	3,048
Food and Kindred Products	3,036
Wholesale and Retail Trade	3,020

Source: The Industrial Commission of Utah, Dept. of Employment Security, Annual Report, 1952.

supplementary employment in slack periods.

A much more reliable measure than hourly or daily wage would be the coal miner's weekly, monthly, and yearly wages. The weekly and monthly wage is highly variable, depending upon the number of days the mines operate during the pay period. The winter season is usually the period of steadiest operation; the mines may work as many as five or six days per week, while in the summer the work week may be only one or two days, if the mines operate at all (Tables 15, 16).

Table 15

AVERAGE WEEKLY EARNINGS AND HOURS WORKED IN THE BITUMINOUS COAL INDUSTRY: 1942-52

Year	Average Weekly Hours Worked	Average Weekly Earnings
1942[1]	34.8	$ 36.58
1943	36.6	41.72
1944	43.3	57.59
1945	42.2	52.33
1946	40.2	58.03
1947	40.7	67.16
1948	37.8	76.76
1949	32.4	63.01
1950	35.1	68.94
1951	35.2	77.92
1952[2]	30.5	68.30

[1]Includes only last three months.
[2]Includes only first nine months.

Source: U.S. Dept. of Commerce, Survey of Current Business.

Table 16

AVERAGE MONTHLY WAGES IN THE UTAH BITUMINOUS COAL INDUSTRY[1]

	1937	1940	1944	1947	1950	1953
1st Qtr.	$ 151	$ 125	$ 251	$ 317	$ 289	$ 409
2nd Qtr.	85	110	271	302	318	416
3rd Qtr.	121	132	251	284	322	410
4th Qtr.	127	142	228	314	329	--
Ave. Annual	124	129	250	303	317	--

[1] Industrial Commission of Utah, Department of Employment Security, Annual Reports and Labor Market Quarterly. Various issues.

The average annual wage in the coal industry has steadily increased since the unionization of the Utah mines. The greatest gains were made in the years following World War II when wage rates were greatly increased and coal production remained at high levels (Table 17).

Table 17

AVERAGE ANNUAL EARNINGS IN THE UTAH BITUMINOUS COAL INDUSTRY, 1937-53

Year	Average Annual Earnings
1937	$ 1,488
1938	1,398
1939	1,280
1940	1,543
1941	1,764
1942	2,268
1943	3,066
1944	3,000
1945	3,132
1946	3,204
1947	3,642
1948	4,020
1949	3,576
1950	3,804
1951	4,224
1952	4,704
1953[1]	3,843[1]

[1]First nine months only.

Source: Industrial Commission of Utah, Department of Employment Security, Annual Report, various years.

It should be pointed out that these statistics are averages for the coal industry of the entire State and do not point out the many variations from the average. Operation in the captive mines are steadier throughout the year than are those in the commercial mines and therefore miners in these mines usually receive a larger than average portion of the income. Nor does it take into consideration the fact that all the mines do not operate the same number of days each year thus making yearly income vary from mine to mine (Table 18).

Table 18

NUMBER OF DAYS WORKED BY MINES AND NUMBER EMPLOYEES, 1952

Number of Days Worked	Mines	Employees
100 or under	13	86
101-150	7	99
151-200	17	1814
201-250	14	1866
251-300	5	99
Over 300	1	9

Source: U.S. Bureau of Mines

The hours worked by the miner have changed considerably as a result of the union. The hours of work are always defined in the contract at about seven hours per day. Previous to the signing of the 1945 Bituminous Coal Wage Agreement the miners made the trip from the mine entrance to the working areas on their own time. With the signing of this contract the portal to portal principle was recognized.[1] Thus the operator pays for

[1]National Bituminous Coal Agreement, April 1, 1945, Section 2.

an average of one and one-half hours of labor without receiving any return.[1]

Paid vacations of ten days' duration for all men are provided in the contract. The union wisely specified that they should be taken in the slack summer season and thus insure the miners a source of income at a time when they would usually not be working.

The most controversial aspect of the miner-union relationship in the past few years is the United Mine Workers of America Welfare and Retirement Fund. This fund, financed by a charge on each ton of coal mined, is for the purpose of providing hospital and medical care, widows and survivors' benefits, rehabilitation for injured miners, disaster relief and pensions to retiring miners. The fund originated in the contract signed by the United Mine Workers of America and the Secretary of the Interior J. A. Krug, who was operating head of the industry after the mines had been seized by the government because of a strike. The original welfare payment was five cents per ton and has in subsequent negotiations been raised to 40 cents per ton. This fund is entirely financed by the operators who feel that the miners who benefit from it should contribute to its support. There is also some desire on the part of the mine owners for federal regulation of the fund. It is felt that the miners' union has too much power by requiring that a man must remain in good standing with the union to receive any benefits from the fund. They also feel that the amount of the benefits should be fixed and not subject to change at the will of the board

[1]O'Conner, W. J., Pres., Independent Coal and Coke Co., Personal Interview.

of trustees which is dominated by the union.

Since the organization of the mines by the miners' union in 1933 the working conditions, pay, and many other aspects of the miner's life have improved considerably. These benefits have come at the expense of the profits of the operators in a rapidly diminishing market and it is felt by some that much of the loss of coal markets is the result of the unsteadiness of the mine labor picture as well as high prices which are a result of increased labor and welfare costs.

Working conditions are rigidly controlled by the union. No change in equipment or operating procedure is effected nor is any new mining area opened until the management has conferred with the union mine committee and obtained its approval. This practice tends to limit the ability of the management in the most efficient operation of the mine and has often increased costs and reduced production.[1]

Labor management relations in Utah are generally good in the opinion of both the operators and the union officials, but both parties expect further demands from the other. The union believes the operators would discontinue any benefits they now give if they ever get the opportunity;[2] while the operators feel that the union is hurting the industry by excessive demands and may destroy their jobs in the process.

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[1]O'Connor, W. J., Pres., Independent Coal and Coke Co., Salt Lake City, Utah.

[2]Sacco, F. R., Secretary-Treasurer, District 22, U.M.W. of A., Personal Interview, December 24, 1953.

CHAPTER SEVEN

COAL MINING SETTLEMENTS

The coal mining town, or "coal camp" as it is commonly called, is a distinctive feature on the landscape of eastern Utah. The location of the facilities of the coal industry has resulted in the building of towns quite different from the other urban centers of the State. The population of the mining areas also presents some striking differences to that of the remainder of the State.

Whereas the typical Mormon village in Utah is laid out on a flat area with square blocks, wide streets, and large individual lots, the site of the mining camp was limited because it had to be built near the mine. The town had to be adapted to whatever terrain was available. While the site selected for the mining town had a large measure of control on the pattern of its development the great differences between the Mormon village and the coal camp is a result of the society which built them and the purpose for which they were designed. The Mormon village was based upon agriculture. The farmers lived in the village and traveled each day to their farms. This pattern gave the people more opportunity for religious and social activity and tended to keep the group together in their actions. On the other hand, the coal mining camp was built by the company for the purpose of providing homes for its workers and the company had no particular concern over the beauty of the town nor the providing of pleasant

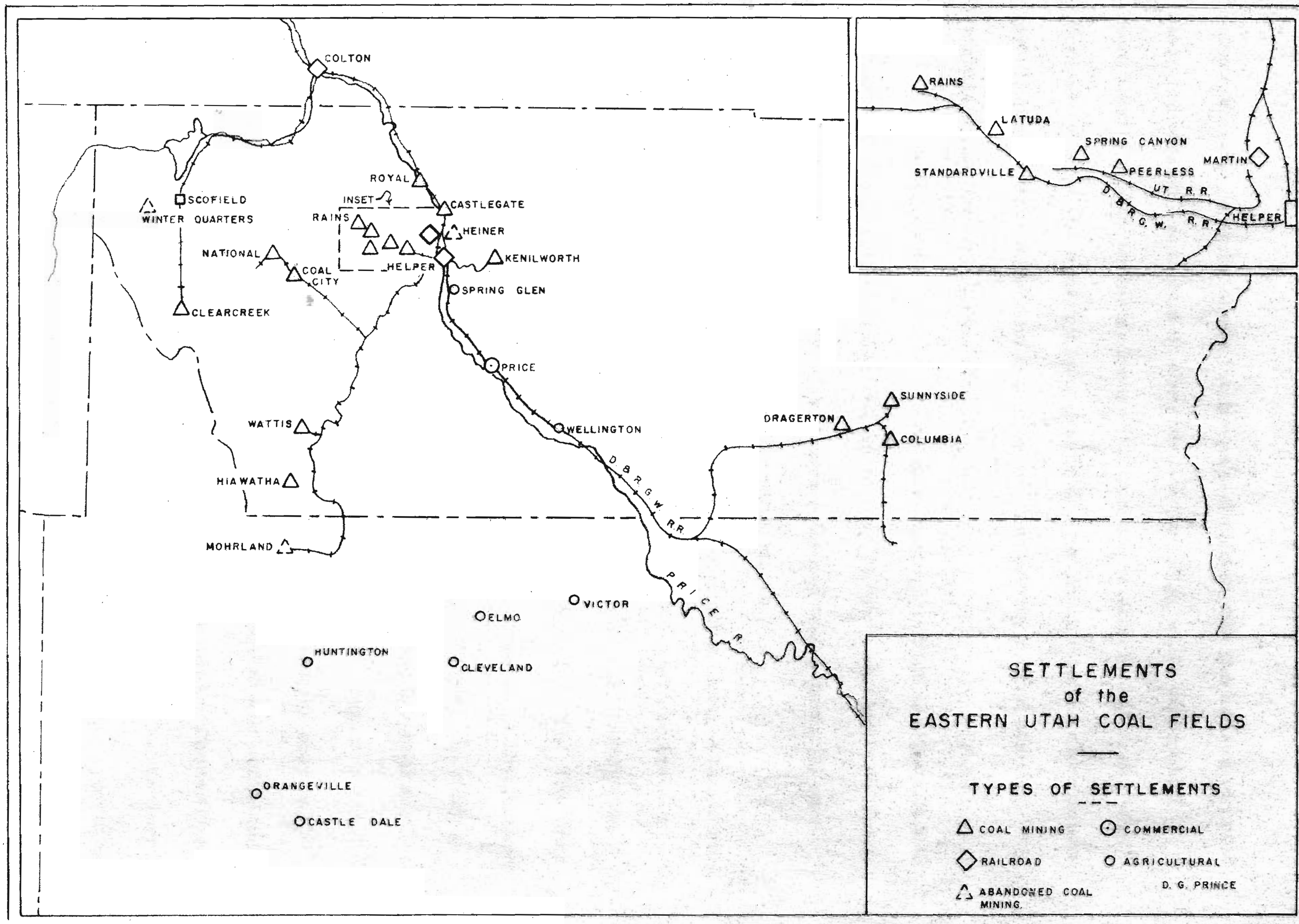
COLTON
SCOFIELD
WINTER QUARTERS
ROYAL
INSET
CASTLEGATE
RAINS
HEINER
NATIONAL
COAL CITY
HELPER
KENILWORTH
SPRING GLEN
CLEARCREEK
PRICE
WATTIS
WELLINGTON
D. R. G. W. R.R.
HIAWATHA
MOHRLAND
PRICE R.
VICTOR
ELMO
HUNTINGTON
CLEVELAND
ORANGEVILLE
CASTLE DALE
SUNNYSIDE
DRAGERTON
COLUMBIA
RAINS
LATUDA
SPRING CANYON
MARTIN
STANDARDVILLE
PEERLESS
UT R. R.
D. R. G. W. R. R.
HELPER
SETTLEMENTS
of the
EASTERN UTAH COAL FIELDS
TYPES OF SETTLEMENTS
COAL MINING
COMMERCIAL
RAILROAD
AGRICULTURAL
ABANDONED COAL MINING.
D. G. PRINCE

PLATE X

surroundings. In some cases the towns were built with the houses in rows along the stream bank, and up the sides of the hills, while others had somewhat better locations and were built on the relatively flat areas which slope away from the escarpment. Regardless of their site the older towns are all characterized by winding, narrow, irregularly placed streets, small lots and frame homes.

The settlements in the eastern Utah mining district are distributed in a pattern which reflects their major roles. These towns can be classified into three general groups: (1) Company-owned coal towns, (2) non-company coal towns, and (3) diversified settlements.

The company-owned coal mining camps are all located in the immediate vicinity of the mines they were built to serve. They were built at the base of the escarpment of the Wasatch Plateau and Book Cliffs in an arc from Hiawatha in the west to Columbia in the east (Plate X). The only coal town in the area not owned by one of the coal companies is Dragerton in eastern Carbon County, which is a good example of the modern mining town that is coming on to the coal mining scene in the past few years. The remainder of the settlements of the area are agricultural, commercial or transportation centers. Spring Glen and Wellington are the only agricultural towns in Carbon County but all the settlements that are scattered through Castle Valley in Emery County are farming centers. These towns are located in areas where sufficient irrigation water is available to permit farming. Price has the advantage of lying astride the major transportation routes through the area, and has evolved from an early Mormon farming community into the major commercial center of southeastern Utah.

Helper has become a major railroad center as a result of its location at the mouth of Price River Canyon where extra engines must be added to pull heavily loaded trains over Soldier Summit. These diversified towns have in later years also become residential areas for miners who commute to the mines.

The population of the Carbon County mining region is concentrated predominantly in the towns and villages of the county. The total population of 24,901 was distributed in the following manner: 43.5 per cent of the population in the mining towns; 43.5 in the other towns; and only 13 per cent in the rural areas.[1]

The isolation of the early coal mines in eastern Utah necessitated the building of a town near the mine which would provide all the necessities of community life for the mine workers and their families. The settlements then existent were farming communities near the rivers where irrigation water could be obtained. As the mines were opened at the base of which rimmed the valley and since no adequate transportation was available, completely new towns had to be built near the mines. The company built and maintained the houses and provided the miner with the means of obtaining food, clothing, medical care, some recreation, and other services. The

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[1] U.S. Bureau of Census, United States Census of Population, 1950, Utah, p. 44-10.

houses built by the company are usually one basic type for the town. In most camps they are single-family frame dwellings, while in some areas two-family stone and frame buildings were constructed. Company ownership of the miner's homes made residence in them dependent upon the pleasure of the mine superintendent. The employee of the company lived in the house as long as he held his job and if he should quit or be discharged he and his family were promptly evicted. This power of eviction was one of the many weapons used by the operators to fight union activity in the coal fields before the final unionization of the mines in 1933. Today the company owned homes are still reserved for its employees, but the threat of arbitrary eviction at the company's pleasure has largely been dispelled. The union is active in insuring fair treatment of its members in all their dealings with management, and the contract provides for agreement between the company and the union on the conditions of tenancy of the miners.

In addition to housing, other community services were provided by the company. Stores were opened to sell groceries, clothing and other items; doctors and medical care were provided; and usually community recreation hall for dances, indoor sports, church meetings and movies was built. The miners were, of course, expected to pay for the services and the use of the facilities and supplies the company provided.

The company store is an institution that has always been upon the mining scene. It is more than a place of business since it is the usual meeting place and social center of the community. In the early periods in the

Utah mines it was the practice to pay the miners in script, to be exchanged at the company store for goods and services. This system has since been declared illegal by the courts and the "check off" system adopted.[1] Under this arrangement the miner may purchase his groceries and other supplies from the store and have the amount spent deducted from his wages at the next pay day. This practice has led to poor budgeting by some miners with excessive credit spending, and when the store bill is deducted from the check there is often little or no take-home pay. Prices in the company stores are thought to be generally, but not always, slightly higher than those in other areas, but this cannot be supported by statistical data.[2]

Medical care, often of only the most elementary type, was furnished by the company in the early mining towns. Today it is provided for in union agreements by deductions from the miner's pay, matched by the employer, or by participation in one of the health insurance plans common in this country. Several of the companies maintain small hospitals near their mines.

The use of leisure time, of which the miner has plenty because of the irregular work, is a problem in the mining communities. In the past the company has provided what little organized recreational activity

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[1] Medical Survey of the Bituminous Coal Industry, Dept. of Interior, Coal Mines Administration, Washington, D.C., 1947, p. 217.

[2] Ibid., p. 215.

there was in the camps. Today the company, union, and in some cases the welfare committee of the town handle this problem. Through deductions from the miner's pay motion pictures are usually shown in each camp several nights each week. Religious activity is encouraged and buildings for church meetings are usually provided by the mining companies.

Kenilworth

No one town can be used as a description of all the mining camps of eastern Utah. Kenilworth, the town built to serve the mine of the same name, is a good example of the company town which embodies all the features of this type of settlement. The town, owned and operated by the Independent Coal & Coke Company, is located at the base of the Book Cliffs a few miles east of Helper. Construction on the town and mine began in 1905; by 1906 the mine was open, a railroad was extended to the mine, and some buildings were completed. The miners at first lived in tents, then in barracks-type buildings, and finally in the many homes which were built. The houses are typical frame one-family home which are well maintained (Figure 32). The rental charge is fixed by negotiations with the union and at the present time ranges from $13 to $18 per month. The store is operated by the company and a large amusement hall with a library and confectionary has been built. Medical care is provided for in the contract. The company pays 70 per cent of the cost and the miners share is paid by

Figure 31. Typical frame homes of the coal miners at Columbia.

Figure 32. Frame miners' homes at Kenilworth. Note the similarity of design and the well kept yards. This town is the property of the Independent Coal and Coke Company.

payroll deductions.[1]

Dragerton

The new type of coal mining community is an expression of the progress in transportation and civic planning since the establishment of the older company-owned towns. The value of home ownership and pleasant surroundings to the stability of the miner has been recognized and improved methods of transportation have enabled the building of a community which supplied these things.

Dragerton is the newest of the Carbon County mining settlements. It was constructed during World War II to provide homes for the miners at the new Horse Canyon Mine of the Geneva Steel Company, and at the expanded Sunnyside operations, then leased to the Kaiser Corporation by the Utah Fuel Company. The site chosen for the town was the first departure from the old pattern of mining towns. It was situated on the nearly level country a few miles away from the Book Cliffs where there were no restrictions on the size of the town, nor the direction of its expansion. It is from four to seven miles from the mines it serves and the miners travel to work by buses or automobiles. Construction was begun in 1942 on the first 725 homes, and when it was completed the town had, in addition to the modern homes, a shopping center, a bowling alley, a theater, a large school, a hospital, a hotel, and several churches. The houses, in contrast to those

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[1] O'Connor, William J., Pres., Independent Coal and Coke Co., Personal Interview.

Figure 33. Typical street in Dragerton. Note the wide paved streets, attractive houses with large yards.

Figure 34. Modern Dragerton Shopping Center.

in the older, company-owned towns, were not identical and they were laid out on wide paved streets, with a large lot for each house.

The town was constructed by the federal government at a cost of five million dollars and it was sold as a war surplus property in 1947 for one and one-half million to the United States Steel Corporation. It was later sold to an eastern real estate corporation which in turn sold the houses to the miners and the stores to private individuals. Thus for the first time coal miners were able to own their own homes.

Price and Helper

Price began as an agricultural and stock raising center in the familiar Mormon pattern shortly before the coal fields of eastern Utah were opened. It was later the supply center for the U.S. Army detachments on the Ute Indian Reservation in the Uintah Basin, and has gradually become the commercial and trading center for the mining areas and for much of southeastern Utah since it is the nearest railroad connection for much of this region. Helper has always been primarily a railroad town, with the shops and roundhouse of the Denver and Rio Grande Western Railroad located there. In recent years it has become a shopping center for many of the miners living in northern Carbon County. The development of Price and Helper as commercial centers is the result of the increased use of the automobile. Since the miner has been able to buy an automobile he is no longer restricted to living and shopping in the mining camp. Most of the business activity of Price and Helper is now directly dependent upon coal mining. The mine payrolls consistently put several million dollars into the Utah economy and most of this is spent in Carbon County (Table 19). In addition to affecting the shopping habits of the coal miner, the automobile has also changed his living conditions. Now the mine worker can drive to work each day and live in a larger town with the increased benefits it will afford his family. Many miners now make their homes in Price, Helper, Wellington and in some other areas in Castle Valley. This trend has especially affected those mining towns in western Carbon County that are close to Price and Helper, In the Spring Canyon district only about twenty per cent of the mine workers live in the mining towns operated by the company for whom they work.[1] However, the mining towns that are more distant from Price are still the residences of the local miners.

Population

The composition of the population of the coal fields is considerably different from that of the rest of Utah. The mine workers are a varied class of men with heterogenous backgrounds. There are men of all age groups and racial groups in the area. The percentage of foreign born in Carbon County is higher than in any other county in the state -- 7.4 per cent in 1950 -- but it is the difference in ethnic composition and religion which characterizes this group of people. In most areas of Utah the people are

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[1] Garff, Odell N., Sales Manager, Spring Canyon Coal Company, Personal Interview.

Table 19

QUARTERLY AND YEARLY PAYROLLS OF THE UTAH BITUMINOUS COAL INDUSTRY,[1] 1937-1953

	1937	1940	1944
1st Qtr.	1,624,669	1,030,926	3,467,266
2nd Qtr.	633,164	660,569	3,387,299
3rd Qtr.	1,041,725	970,987	3,140,153
4th Qtr.	1,378,956	1,288,702	2,899,501
Total Year	4,678,514	3,951,184	12,894,219

	1937	1940	1944
1st Qtr.	4,444,978	2,878,059	5,003,649
2nd Qtr.	3,963,999	4,252,114	5,466,894
3rd Qtr.	3,890,780	4,402,296	4,981,017
4th Qtr.	4,695,902	4,766,766	--
Total Year	16,995,659	16,299,235	--

[1] Industrial Commission of Utah, Department of Employment Security, Annual Reports and Labor Market Quarterly. Various issues.

largely of northern European ancestry; the population of Carbon County is characterized by a much larger percentage of people from central and southern European countries (Table 20).

Although the Church of Jesus Christ of Latter-Day Saints is the largest single religious group in the coal fields, it is not the dominant group as it is in most of the State of Utah. Many other denominations maintain churches in the area, with large and active congregations.

This mixture of different peoples and groups has produced a population of diverse cultural backgrounds that has been able to live, work and play together with no hint of racial or religious intolerance for many years.

The Carbon County area is the only large-scale coal producing region in Utah, and the landscape is a result of this dominant activity. The location of most of the towns is determined by the location of the mines and even those towns not directly connected with coal mining owe their existence to the industry: Price as a commercial and residential center; Helper as a railroad town dependent upon the coal traffic and the other small towns as agricultural and residential centers. The dominance of coal in the economy of the area is further emphasized when it is noted that only a small portion of the people are engaged in agriculture and in the remaining labor force over fifty per cent are engaged directly in coal mining.

Table 20

BIRTHPLACE OF FOREIGN BORN PERSONS IN CARBON, UTAH, CACHE, AND WEBER COUNTIES, UTAH

COUNTRY	Carbon	Utah	Cache	Weber
British Isles	217	535	225	912
Scandinavia	29	367	350	459
Netherlands	1	53	10	615
France	50	17	7	25
Germany	35	137	126	180
Poland	9	8	4	17
Czechoslovakia	3	3	-	11
Austria	172	25	1	89
Hungary	12	8	1	5
Yugoslavia	149	5	1	10
U.S.S.R.	10	8	4	31
Lithuania	5	-	1	2
Finland	23	29	2	1
Rumania	2	-	-	3
Greece	337	44	4	99
Italy	508	71	8	252
Other Europe	26	85	231	113
Asia	18	47	79	25
Canada	54	359	91	203
Mexico	163	130	29	164
Other America	3	22	14	16
All Other	8	88	31	103
Total	1,834	2,039	1,219	3,335

Source: U.S. Census of Population, 1950, Utah.

CHAPTER EIGHT

SUMMARY AND CONCLUSIONS

The declining role of coal in the production of energy in our industrial economy reflects the present superior position of the negative forces of decline over the positive forces of growth. Some pertinent factors of expansion and contraction are as follows:[1]

1. Expansion

    a. Growth of population.
    b. Expansion of industrial output.
    c. Increased coal requirements by expanding industries.
    d. Increased mechanization in coal mining.
    e. New techniques of coal consumption.

2. Contraction

    a. Displacement of coal as fuel by natural gas, fuel oils, and water power.
    b. Higher efficiency in the coal-consuming industries.
    c. Rising costs of producing and marketing coal.

The population increases in the West during and since World War II have been large and industrialization of the region is much greater than before the War. Mechanization and output in the bituminous coal mines of Utah have increased, some new uses for coal have been developed, along with new techniques for utilizing coal.

However, these expansions and improvements have been more than offset by the contraction of other markets.

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[1]Zimmerman, Erich W., World Resources and Industries, (New York: Harper and Brothers, Publishers, 1951). p.

Generally, physical conditions in the coal fields are favorable for the exploitation of the tremendous coal reserves found in the region. The coal beds are practically undisturbed, the seams are thick, and they outcrop in many places along the escarpment, making entry into the seam fairly easy. The marketing of Utah coal has become increasingly difficult as competition for the fuel market has intensified since World War II. This condition has resulted from increased competition from other coal-producing areas, competition from other fuels, increasing efficiency in the burning of coal, and the unsteadiness of the coal supply because of continued labor disputes in the coal industry. The market for Utah coal has always been largely intrastate, with considerable amounts marketed in the Pacific Northwest. The sale of Utah coal in the Northwest, in spite of competition from coal-producing areas closer to this market, has been possible because of the higher quality of the Utah product. The building of the western steel industry has provided a stable market for a large amount of Utah coal and has somewhat eased the effect of the loss of much of the commercial market. Further losses in the commercial market of the Pacific Northwest may be expected in the future when imports of oil and natural gas from the Canadian fields begin.

The fact that the Utah coal industry is in trouble is obvious. The cause of the difficulty begins in the coal fields. Here the capacity of the mines is almost double that needed to fill present requirements for bituminous coal. The result is unregulated competition between coal producers which keeps prices at a very low point, while rising costs of labor, mine equipment, and transportation have increased to a point where the producers can realize little or no profit. Two consecutive mild winters and increased use of oil and natural gas for heating have further reduced the production of the industry and in early May 1954 nearly 1100 miners were unemployed in the Utah coal fields.

It is the belief of some people that the present depressed condition of the coal industry is only a temporary affair. The President's Materials Policy Commission and most of the coal operators believe that in the next twenty years the demand for energy will at least double and that the coal industry will be called upon to supply an increasing portion of this new demand.[1] If this forecast is correct, and there are some people who believe that it is not, then the problem of the industry is to maintain its present position until this new demand develops. To do this the industry must at least keep its present markets, if possible, gain new markets and stabilize its own operations. This program can be accomplished in four ways: (1) research in new uses for coal, (2) attraction of new industry to mining areas to increase the use of coal and to employ idle mine workers, (3) subsidization of the industry in various forms by local, state, and federal government units, (4) control of production and marketing facilities by licensing producers and distributors to prevent excessive production and waste in developing coal reserves.

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[1] President's Materials Policy Commission, Resources for Freedom, Vol. III, (Washington, D.C.: U.S. Government Printing Office, 1952, p. 24.

Research into the properties of coal holds the most promise for the future prosperity of the coal industry. This work is presently being carried on largely by the Bituminous Coal Research, Inc., which is supported by the individual coal producers. Additional work is being done by the United States Bureau of Mines and by the state universities in many of the coal-producing states. The tool of research can be used in several ways: (1) in developing new ways to use coal as coal, (2) in creating new equipment to burn coal with more convenience and efficiency, (3) in finding new ways to use coal in other forms, and (4) in developing new mining machines and methods to further reduce mining costs.

Probably the most promising attempt to utilize coal in new ways is the program to develop a coal-fueled gas turbine engine which burns pulverized coal. The present tests are mainly designed to perfect a gas turbine locomotive in an attempt to regain some of the fuel markets lost when the railroads switched from coal to diesel burning engines. If the locomotive can be perfected there is no reason why this type of engine cannot be adapted to other uses, such as for marine engines or electric power generating plants. Research in methods of burning coal in domestic heating plants more conveniently and efficiently is necessary if the industry is to compete with natural gas and fuel oil in the home heating plants. The main reason for the switch from coal to other fuels in home heating is the convenience of using oil or gas. The coal industry must develop better equipment to burn coal and at the same time the consumer must be made aware of the economies of burning coal. At the present time some Utah producers are marketing small, efficient stokers in an attempt to keep their domestic market. The possibility of the coal producers selling heating equipment at cost to the consumer to encourage the use of coal is now being investigated.

The possibilities for using coal in other forms for producing energy or chemical products seem limitless if markets for these products can be developed and the other sources of these products are depleted. At the present time there are extensive experiments being carried on to discover new coal tar products. The byproducts of coal are now generally obtained from the coke ovens but experiments are being carried on to remove these products from coal in many different ways. The United States Bureau of Mines now has a plant in Missouri which is successfully producing high-grade motor fuel from coal, a process which should open tremendous markets for coal as our oil reserves are depleted. Tests are also being conducted to determine the possibility of burning coal in the seam to produce gas that can be utilized for heating or industrial purposes. This may be a way in which the seams of coal too thin to be mined can be utilized. However as the depletion of the nation's oil reserves in the near future is unlikely, full development of these processes is not immediate.

Development of new types of mining machines has been rapid in the past few decades. These machines have lowered mining costs and raised output but these gains have been lost to the producer by ever increasing labor, transportation, and equipment costs. The attempts to further improve mining machines is continuing and the latest development is the continuous miner, a machine which performs all the operations of the mining cycle. The first of these machines to be used in Utah are now in operation in the Sunnyside mines of the Kaiser Steel Corporation. The increased mechanization of the mines has lowered the costs of production in the mines but at the same time it has further aggravated some of the problems already facing the industry. With the introduction of each new machine the capacity of the mines is further increased and some unemployment has been caused by the displacement of miners by machines.

The attraction of new industry to the coal-mining regions would not only aid the mines by providing new markets for coal but it would stabilize the economy of the region in general by giving it a more diversified economic base. New industry would bolster the economy of the coal fields in two ways: (1) by creating new markets for coal, and (2) by creating new jobs for the displaced miners or other members of their families so that they would have an income during periods of idleness in the mines. At the present time the Utah Power and Light Company is constructing a 66,000 kilowatt steam generating plant at Castlegate. When this plant goes into operation it will burn 400 tons of coal per day. It will not provide any large number of new jobs but it will mean a stabilization of the work schedule of the mines supplying the coal. Several attempts have been, and are now being made to attract other industries that could utilize the resources of the area but so far none have been successful.

Different forms of government subsidization of the industry could be used to relieve some of its problems. The most likely ones to be used would be restrictions on imports of fuel oils and natural gas, quick tax write-offs on industrial plants established in the mining regions, and the increased use of coal by all government agencies. There is some doubt that these programs could be put into effect because of the opposition they would provoke from the producers of these other products.

The control of production and marketing of coal by licensing the producers and dealers would do much toward the stabilizing of the industry and preventing of waste in the development of our coal reserves. By licensing the facilities of the industry the amount of coal produced each year could be controlled and much of the severe competition between producers could be eliminated while a reasonable amount of profit could be assured the producer. Although the coal reserves of the State seem to be inexhaustible the piecemeal opening of mines and the great waste which results cannot be permitted if we are to realize the greatest amount of good from our resources. Every time a small mine is opened and later abandoned when it is not profitable to continue operation, the entries and tunnels of that mine are allowed to cave in and this area cannot be worked again and much of the coal left in the mine is lost forever. These mines are usually opened in the best possible locations and so the better mining locations and coal beds are being used or wasted without being fully utilized. Some mines in the State through faulty planning and poor methods have recovered only eight to ten per cent of the coal in the seams they work thus losing large amounts of coal that may be needed in the future. Little can be done to direct the way in which privately owned coal lands can be utilized but licensing of producers and proper control of government owned lands can do much to stabilize the industry at the present and to insure its future.

The future of the Utah coal industry is of importance to everyone in the West, and especially to the people of the Carbon County area where the whole economic structure is based on the mining of coal. Although the long range forecast for coal is favorable the immediate outlook is anything but encouraging. Further losses of fuel markets seem inevitable and this will probably result in increased unemployment in the mining regions. These areas have a great potential wealth but they will probably be areas of distress and unemployment for many years to come.

BOOKS

Coleman, McAlister, Men and Coal. New York: Farrar and Rinehart, Inc., 1943. 350 pp.

Daughters of the Utah Pioneers, Centennial Echos from Carbon County. Price, Utah: Daughters of the Utah Pioneers, 1948. 283 pp.

Devine, Edward T., Coal, Bloomington, Ill.: American Review Service Press, 1925. 448 pp.

Hunt, E. E., What the Coal Commission Found. Baltimore: The Williams and Wilkins Company, 1925. 416 pp.

Madsen, C. H., History of Carbon County. Price, Utah: Carbon County Board of Education, 1947. 58 pp.

Sutton, Wain, Utah-A Centennial History. New York: Lewis Historical Publishing Company, 1949. 3 Volumes.

Utah Conservation and Research Foundation, Low-Temperature Carbonization of Utah Coals. Salt Lake City, Utah. Conservation and Research Foundation, 1939. 872 pp.

Utah Historical Records Survey Project, Inventory of the County Archives of Utah, Number 4, Carbon County (Price). Ogden, Utah: The Utah Historical Records Survey Project, 1940. 261 pp.

Zimmerman, Erich W., World Resources and Industries. New York: Harper and Brothers, Publishers, 1951. 832 pp.

PERIODICALS

Anderson, G. S., "Hauling Coal to Market," Mining and Metallurgy, 29:572-573, October, 1948.

"Available Coal for Western Steam Plants," Electrical West, 103: 67, October, 1949.

"Belt Pulls Shuttle-Car Output up Seven Per Cent Grade at Standard," Coal Age, 52:82-85, September, 1947.

"Concentration at Sunnyside," Coal Age, 53:92-96, December, 1948.

Craighead, S. J., "One Quarter of Utah's Commercial Coal Produced at King Mine," Mining and Metallurgy, 29:569:572, October 1948.

Heiner, Claude P., "Economics of Coal for West Coast Power Generation," Mining Engineering, 1:388-397, November, 1947.

"High Tonnage Mining," Coal Age, 56:107-108, October, 1951.

Hyatt, Wesley, "Sunnyside of Utah," Coal Age, 49:68-70, September, 1944.

Nyman, Fritz, and Wesley Hyatt, "Shuttle Cars Increase Loader Output in Pitching Coal," Coal Age, 50:93-95, June, 1945.

Parry, V. F., "Trends in Production of Coal and Energy in the Western United States as a Result of the War," Proceedings of the Rocky Mountain Coal Mining Institute, 43:10-30, 1947.

Riches, L. Victor, "Utah's Coal Industry," Utah Economic and Business Review, 12: No. 8, 4-5, July, 1952.

"Trackless Mining at Wattis," Coal Age, 53:78-83, November, 1948.

Waggoner, C. L., "Observations on Raw Materials used in the Geneva Steel Plant," Proceedings of the Rocky Mountain Coal Mining Institute, 43:77-82, 1947.

GOVERNMENT DOCUMENTS

"Analyses of Utah Coals," United States Bureau of Mines Technical Paper, 345, Washington, D.C., 1925. 90 pp.

Clark, Frank R., "Coal Near Wales, Sanpete County, Utah," United States Geological Survey Bulletin 541, Part 2, Washington, D.C. 1912. Pp. 478-489.

________________, "Economic Geology of the Castlegate, Sunnyside, and Wellington Quadrangles, Carbon County, Utah," United States Geological Survey Bulletin 793, Washington, D.C., 1928. 165 pp.

Fisher, D. Jerome, "The Book Cliffs Coal Field in Emery and Grand Counties, Utah," United States Geological Survey Bulletin 852, Washington, D.C., 1936. 104 pp.

Gregory, Herbert E., "The San Juan Country," United States Geological Survey Professional Paper 188, Washington, D.C., 1938. 138 pp.

Harrington, D. and S. P. Howell, "How to Use Permissible Explosives Properly," United States Bureau of Mines Information Circular 6871, Washington, D.C., January 1936. 44 pp.

Hotchkiss, Willard E., and others, Mechanization, Employment, and Output per Man in Bituminous-Coal Mining, Philadelphia: WPA, National Research Project, 1939, 2 vols. 432 pp.

Lupton, Charles T., "Geology and Coal Resources of Castle Valley in Carbon, Emery and Sevier Counties, Utah," United States Geological Survey Bulletin 628, Washington, D.C., 1916. 88 pp.

A Medical Survey of the Bituminous-Coal Industry, United States Department of Interior, Coal Mines Administration, Washington, D.C., 1947. 244 pp.

"Mineral Market Report Number 2221, Distribution of Oven and Beehive Coke in 1952," United States Bureau of Mines Mineral Industry Surveys, 1953. 40 pp.

Parry, V. F., "Trends in the Use of Energy in the Western States with Particular Reference to Coal," United States Bureau of Mines Report of Investigations Number 3680, January 1943. 44 pp.

President's Materials Policy Commission, Resources for Freedom, Washington, D.C., 1952. 5 volumes.

Richardson, G. B., "The Harmony, Colob, and Kanab Coal Fields Southern Utah," United States Geological Survey Bulletin 341, Part 2, Washington, D.C., 1909. Pp. 379-400.

________________, "The Book Cliffs Coal Field," United States Geological Survey Bulletin 316, Washington, D.C., 1907. Pp. 302-320.

________________, "Reconnaissance of the Book Cliffs Coal Field," United States Geological Survey Bulletin 371, Washington, D.C., 1909. 54 pp.

Sherman, Allen, and Allen B. MacMurphy, Facts About Coal, United States Bureau of Mines, Washington, D.C., 1950. 20 pp.

Spieler, Edmund M., "Wasatch Plateau Coal Field, Utah," United States Geological Survey Bulletin 819, Washington, D.C., 1931, 210 pp.

Spieler, E. M., and A. A. Baker, "Geology and Coal Resources of the Salina Canyon District, Sevier County, Utah," United States Geological Survey Bulletin 796, Washington, D.C., 1927. Pp. 125-170.

Taff, J. A., "The Book Cliffs Coal Field, Utah West of Green River," United States Geological Survey Bulletin 285, Washington, D.C., 1906. Pp. 289-302.

________________, "The Pleasant Valley Coal District, Carbon and Emery Counties, Utah," United States Geological Survey Bulletin 316, Washington, D.C., 1907. Pp. 338-358.

United States Department of Commerce, Bureau of the Census, Census of Population, Part 45, Utah, 1950, Washington, D.C.

United States Department of Commerce, Bureau of Foreign and Domestic Commerce, Office of Business Economics, Survey of Current Business, Washington, D.C. Various issues.

United States Bureau of Mines, Minerals Yearbook, Washington, D.C. Various issues.

United States War Department, Explorations and Surveys for a Railroad Route to the Pacific Ocean, 1853-54, Vol. 2, Washington, D.C., 1855. 544 pp.

Utah State Department of Publicity and Industrial Development, After Victory Plans for Utah and the Wasatch Front, Salt Lake City, Utah, June 1943.

Utah State Investigating Committee of Utah Governmental Units, An Economic Study of the Development of the Utah Coal Resources, Price, Utah, October, 1946. 139 pp.

Industrial Commission of Utah, Department of Employment Security, Industrial Pattern as of September 30, 1947, Carbon, Emery, Grand and San Juan Counties, 1948. 45 pp.

Wegemann, Carrol H., "The Coalville Coal Field, Utah," United States Geological Survey Bulletin 581, Part 2, Washington, D.C., 1913. Pp. 161-187.

Woolley, Ralf R., "The Green River and its Utilization," United States Geological Survey Water Supply Paper 618, Washington, D.C., 1930. 456 pp.

________________, "Cloudburst Floods in Utah, 1850-1938," United States Geological Survey Water Supply Paper 994, Washington, D.C., 1946. 128 pp.

UNPUBLISHED MATERIALS

Boravatz, Steve N., "The Settlement of Carbon County and the Development of Schools," Unpublished Masters Thesis, Department of Educational Administration, University of Utah, 1953. 127 pp.

Clark, Joseph C. Jr., "A History of Strikes in Utah," Unpublished Masters Thesis, Department of Economics, University of Utah, 1953. 137 pp.

Johnson, David F., "The History and Economics of Utah Railroads," Unpublished Masters Thesis, Department of Economics, University of Utah, 1947. 151 pp.

Lewis, Anna Viola, "Development of Mining in Utah," Unpublished Masters Thesis, Department of History, University of Utah, 1941. 139 pp.

Memmott, Frank C., "Development of the Union and Coal Production in Carbon County, Utah," Unpublished Masters Thesis, Brigham Young University, 1950. 89 pp.

Robbins, J. Spencer, "The Mechanical Preparation of Coal with Special Reference to a Utah P ant," Unpublished Bachelor of Science Thesis, Department of Mechanical Engineering, University of Utah, 1941. 82 pp.

Roe, James M., "Some Important Impacts of Geneva Steel on the Utah Economy," Unpublished Masters Thesis, Department of Management, University of Utah, 1953. 223 pp.

PERSONAL INTERVIEWS

The following interviews were made during the period December 1953 to April 1954.

Allen, C. S., District Manager, Jeffrey Manufacturing Company, Salt Lake City, Utah.

Arnett, Leonard L., Utah State Coal Mine Inspector, Price, Utah.

Garff, Odell N., Sales Manager, Spring Canyon Coal Company, Salt Lake City, Utah.

Jackson, Thomas C., Superintendent, King No. 1 Mine, United States Fuel Company, Hiawatha, Utah.

James, D. A., Secretary and Sales Manager, Liberty Fuel Company, Salt Lake City, Utah.

Manley, B. P., Executive Secretary, Utah Coal Operators Association, Salt Lake City, Utah.

Marinoni, Mrs. Andrew, Secretary, Soldier Canyon Coal Company, Price, Utah.

Odendhal, Mrs. W. B., Secretary, Starpoint Coal Co., Price, Utah.

O'Connor, William J., Pres., Independent Coal and Coke Company, Salt Lake City, Utah.

O'Neal, Thomas H., Federal Coal Mine Inspector, U.S. Bureau of Mines, Salt Lake City, Utah.

Ramey, Russell, Mine Engineer, King No. 1 Mine, U.S. Fuel Company, Hiawatha, Utah.

Reeder, R. D., Chief, Salt Lake City Office, Accident Prevention and Health Division, U.S. Bureau of Mines, Salt Lake City, Utah.

Sacco, Frank. J., Vice-President, District 22, United Mine Workers of America, Price, Utah.

Stringham, J. Grant, Secretary-Treas., Western Coal Mining Co., Salt Lake City, Utah

Ure, James, The Industrial Commission of Utah, Department of Employment Security, Salt Lake City, Utah.

Woodhead, Vern, Independent Coal and Coke Company, Salt Lake City, Utah.

APPENDIX

APPENDIX A[1]

Labor stoppages in the Utah bituminous coal industry, 1933-1952.

Companies	Dates	Workers Involved
Spring Canyon & Gordon Creek districts	Aug. 1933	800
All companies	Sept. 23-30, 1935	2,000
Utah Fuel Co.	May 9-17, 1940	60
All companies	Apr. 1-9, 1941	3,000
U.S. Fuel Co.	Aug. 26-30, 1942	300
All companies	May 1-3, 1943	3,400
All companies	June 1-30, 1943	3,500
All companies	Oct. 30-Nov. 3, 1943	3,500
Utah Fuel Co. & Kaiser Corp.	Mar. 2-10, 1945	500
Kaiser Corp.	May 23-30, 1945	200
All companies	April 1, 1945	4,000
U.S. Fuel Co.	May 28-30, 1945	150
Utah Coal Co.	June 11-12, 1945	23
Geneva Steel Co. (Horse Can.)	June 27-29, 1945	600
Arronco Mine	July 9-11, 1945	22
Utah Fuel Co. & Kaiser Corp.	Dec. 20-27, 1945	600
All companies	Apr. 1-May 29, 1946	3,500
" "	Nov. 21-Dec. 7, 1946	4,000
" "	Apr. 1-9, 1947	4,500
" "	June 23-27, 1947	3,000
" "	June 28-July 8, 1947	3,000
" "	June 26-July 6, 1948	4,000
U.S. Fuel Co.	Dec. 14-16, 1948	450
All companies	June 13-20, 1949	4,500
" "	Sept. 19-Nov. 10, 1949	4,500
" "	Dec. 1-2, 1949	4,500
Independent Coal & Coke Co. (Kenilworth)	May 29-30, 1950	350
Geneva Steel Co. (Horse Can.)	Aug. 11-14, 1950	785
Kaiser Corp.	Sept. 19-22, 1950	536
Independent Coal & Coke Company	May 7, 1951	293
Geneva Steel Co. (Horse Can. & Columbia)	June 26-July 16, 1951	1,100
Kaiser Corp.	Oct. 24-31, 1951	600
" "	Jan. 18-19, 1952	600

Kaiser Corp. & Geneva Steel Co.[1]	Jan. 23-Feb. 12, 1952	1,800
Kaiser Corp.	Feb. 15, 1952	120
" "	Feb. 16, 1952	600
Geneva Steel Co.	Feb. 27, 1952	1,600
Eastern Utah Coal Co.	Mar. 17-Apr. 8, 1952	28
Kaiser Corp. & Geneva Steel Co.	Mar. 20-22, 1952	1,600
U.S. Fuel Co.	Mar. 24-25, 1952	400
Kaiser Corp.	Apr. 18-May 1, 1952	1,100
Geneva Steel Co.	Sept. 2-24, 1952	1,100
Coal Creek Coal Co.	Nov. 4-7, 1952	28
Kaiser Corp.	Dec. 5, 1952	916

[1] Clark, Joseph C. Jr., History of Strikes in Utah, op. cit., p. 22-24.